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THE MEASUREMENT OF ILLUMINATING EFFICIENCY.

It has been customary to base the estimation of the efficiency of any lighting installation upon measurements of the illumination received upon a horizontal plane 30 inches above the floor of a room or the surface of the street. This has been considered a suitable working plane to represent average conditions of use of the light and consequently a suitable plane to measure the intensity of illumination received. While such a measurement is no doubt very useful and in some cases entirely adequate, in others it is entirely unsatisfactory as far as giving an indication of the suitability of the illumination existing to the purposes for which it is to be used. Indeed for general purposes of illumination, as distinct from the lighting of a definite piece of work, the amount of light received on this test plane might measure up to the specified value while the conditions for seeing were very poor. Unless consideration is given to the light which would fall upon a vertical plane, and indeed from a number of different directions, no adequate judgment can be made of the sufficiency of the illumination. To really determine illuminating efficiency, account should be taken not only of the amount of light which reaches the test plane but the manner in which the light gets there. The distribution of the incident flux at a point is very important. The light measured upon the plane test surface may be due to a single point source, or it may reach this area from many directions and its usefulness will differ according to its diffuseness.

These points were emphasized in two of the papers which were presented at the recent convention of the Illuminating Engineering Society, and while it must be patent that a single measurement of illumination is unsatisfactory, no substitute which would be generally acceptable was suggested. It is evident that at any test station more than a single measurement must be made in order to get adequate information. By turning the test plane at different angles, sufficient information can be obtained to determine the general distribution of illumination. This, however, involves a large number of observations. Even if these positions are restricted to three principal planes, one horizontal and two vertical at right angles, five or six measurements will be involved. These are sufficient to determine the total flux of light at the station, a quantity which cannot be obtained from a single measurement. If both sides of

each one of these planes is measured there will be six observations, while if the lower side of the horizontal plane is omitted, five will be sufficient. In many cases it would seem that these five measurements, taken at a smaller number of stations, would be of more value than measurements on a horizontal plane only at a larger number of test stations. At any rate some means must be taken to indicate the diffuseness of the illumination. In some reports of tests it has been only too conspicuously apparent that the measurements on a horizontal plane did not give the necessary information.

THE METALLIC-VAPOR LAMP.

The great disadvantage of the mercury-vapor lamp has been its color. The lack of the proper proportion of red and yellow rays gives this lamp a characteristic which is not only unpleasant in some particulars but which makes it valueless in any work where color matching or similar appreciation of color values is required. This defect has been to a considerable extent obviated in three ways: (1) by the use of a light-transforming reflector of rhodamine, which when green, blue and ultraviolet light falls upon it, gives forth radiation which is red in color; (2) the combination in a single lamp of a mercury element and an element using the tungsten filament; (3) the use of a quartz tube. The mixture of light achieved in the first two methods contains the red and yellow elements as well as the blue and green, and, therefore, is a great improvement in color value over the mercury-vapor lamp alone. It cannot be considered as satisfactory, however, as a vapor lamp which would give light which is white, or approaches white in color. This is more nearly attained in the quartz-tube lamp, which possesses in addition a much better efficiency.

It appears that the use of cadmium amalgam in the place of mercury in a vapor lamp produces a light which is much superior in color to that obtained from mercury, the red and blue spectral lines of cadmium supplementing the yellow, green and violet of the mercury. A lamp of this character has been worked out by Messrs. M. Wolfke and C. Ritzmann, and is described elsewhere in this issue. While some difficulties were met with at first, the development of the lamp has been finally achieved, a quartz tube being used for the containing vessel. The amalgam contains 10 per cent or less of mercury. It appears that the cadmium-amalgam lamp is not so efficient as the mercury lamp in small units, but where the wattage exceeds 500 watts the efficiency is superior. In large units, therefore, the cadmium lamp would seem to be preferable to the mercury lamp on both grounds of efficiency and quality of the light. Even in smaller lamps, however, where the efficiency is not so good, the improvement in color would no doubt for most purposes more than make up for the slight difference in efficiency which is involved. It is claimed that natural colors are no more distorted than with an ordinary arc lamp. In large sizes a specific consumption of 0.16 watt per Hefner unit is claimed, which corresponds to 0.18 watt per international candle. The development of this lamp is a distinct step in advance.

MUNICIPAL APPEAL TO STATE COMMISSION.

A curious situation has arisen in Pasadena, Cal., owing to competition between a municipal plant and a corporation plant.

The municipal plant is charging its customers a maximum of five cents per kilowatt-hour for residence lighting and four cents for power. To meet this competition the electric corporation has cut this price, although charging the old price in neighboring municipalities. The municipal officials claimed that this was discrimination, and appealed to the State Commission to require the electric corporation to charge the same rates in Pasadena as elsewhere. As reported elsewhere in this issue, the Commission has refused to interfere, stating that regulation of rates in municipalities is, under the law, the function of the municipal government.

What the municipality may attempt to do in the present case it is not for us to prophesy but it would be curious indeed to find a municipality endeavoring to force a public utility corporation to increase its rates. Anyhow, it seems an anomalous condition when one party in competition has legal authority not only over the franchise but also over the rates of the other.

In California the municipality is supreme in its own field, unless by vote it delegates its powers to the State Commission. There is thus no protection to a private company from municipal competition. There is also no provision in the California law for the acquisition by a municipality of a private plant.

It is becoming more and more apparent that the details of public utility regulation have not been thoroughly worked out in most of the states, even where acts have already been passed.

It behooves the men interested in public utilities in states about to pass laws of this kind, such as Indiana, Kentucky and Pennsylvania, to take active steps in the direction of securing desirable provisions in such bills. None of those features which have proven so effective and so satisfactory in Wisconsin, from the standpoints of both the operators and investors in utilities and the consuming public, should be omitted in new legislation. In some of the states, those interested in utilities have made the mistake of fighting *against* legislation, instead of fighting *for* good legislation. After opposing all legislation on the subject, lobbyists are not in a favorable position to secure consideration of their views as to the provisions of a bill from those in charge of the measure. And after a bill is once enacted into law, it is more difficult to amend it than before it is passed.

BRINGING THE MOTORS TO THE WORK.

"If the mountain will not come to Mahomet, Mahomet must go to the mountain." Old as this saying is, it still has a most important lesson for our machinery builders, motor salesmen and power solicitors. Looking over the field of electric power as a whole, one cannot help being impressed with the extent to which electricity is still handicapped by being harnessed to equipment originally designed for use with other means of driving the same. In most cases, the source of power formerly used with such equipment would not lend itself to the ready shifting of positions and directions which are among the advantages of the electric motor, hence the equipment as well as the methods of using the same were planned on the supposition that this source of power must remain stationary. Then when motors began to replace the older means of propulsion, it was natural that these should at first have been adapted to the machinery and methods which had been designed to meet the former limitations.

However, the redesigning of one machine after another is beginning to bring with it a recognition of the greater latitude permitted by the introduction of electric power, and a consequent readjusting and improving of many manufacturing methods. Some of the forms which these changes may take and the way in which they may affect a surprising range of occupations, can be seen from an article in another column of this issue. However, it is too early as yet to judge of the extent to which this greater adaptability will influence industrial methods, for our power solicitors are still in the habit of judging prospective installations with a view to having the motor act as a direct substitute for some older form of drive. To do justice to the real possibilities of the electric motor, they must first break away from this old and limited point of view; for the ability to take the motor to the work and to use it in any position is opening up new departures which are bound to exercise a strong influence on many occupations.

Some of these unconventional applications of electric power, while at first seeming impractical, may yet have a decided value both in their early forms and in the adaptations that will naturally follow from the same. For instance, the idea of leaving cows out in the pasture during mild weather and running a cable to them so as to use electrically driven milking machines without first driving the cattle to the barns, may sound almost ludicrous to those who know how few dairymen have current available at any distance from their buildings. Yet in some parts of Europe, where the so-called "overland central stations" are catering to the farmers along circuits between the towns and terminals are carried on many poles for supplying current through transformer-wagons to threshing machines and other implements, such a carrying of the motor to the work may be both possible and practical. But why invert the usual practice of driving the cattle to the barns where power-driven milking machines can be so much more easily installed?

The answer comes from the dairy farms at Hobrechtsfelde near Berlin, where it has been demonstrated that there is a considerable loss of lacteal output due to driving the cattle to the barns. With the older method, the milk supply was figured on the basis of what was available close to a stationary motor, thereby introducing an appreciable loss before the source of power was reached. But for maximum effectiveness, no such acceptance of an initial loss can be tolerated, since the real problem may just as logically start at the work as at some established current tap. If there is any considerable distance between the two, we immediately have two methods available and we must judge the pros and cons of moving either the motor or the work. Only by figuring both ways and comparing the advantages of each method can we hope to secure the maximum effectiveness of the use of motor-driven appliances in our varied industries. To do otherwise is to continue under the handicap which non-electric sources of power have imposed on so many tools and industries.

The wonderful adaptability of electric power distribution has made it unfair to continue the old assumption that the source of power is practically immovable, and some of the most interesting developments in the use of electric motors may come from a more general recognition of its ease of adaptation to radically new industrial methods.

LEVELING LOAD CURVES BY HEAT STORAGE.

An exceedingly interesting experiment and one that may have an important bearing on the future earnings of many central stations, is being made by the municipal electric light plant at Gothenburg in Sweden. Ample power for this plant is obtained by shunting the Trollhaettan waterfall, though a steam plant is still kept in reserve for emergency use. Having introduced electric power into nearly all the local industries, the plant at Gothenburg is already operated close to its capacity for about 4,300 hours per year, on an average of 12 hours per day.

Now experiments are being made on the warming of buildings by electrical heat stored during the low-load hours of the night in oven-type stoves. The municipal budget for 1912 included an appropriation of 5,500 marks (about $1,320) for this purpose. A transformer substation to supply the current for heating a house with ten flats (a total of 55 rooms) is being erected, the heaters to be equipped with automatic controlling devices. In addition to this group of rooms, about a dozen separate dwellings, stores and offices are to be heated in this way. The results will be awaited with interest, not only in Europe, but in the United States as well, since such a storage of heat during the later hours of the night would furnish a novel means of leveling the load curve of the average central station.

Program of Meeting of Mechanical Engineers.

The annual meeting of the American Society of Mechanical Engineers will be held in New York City, December 3 to 6. Ten sessions are contemplated with papers grouped to form symposiums upon various subjects.

On the evening of Tuesday, December 3, Alexander C. Humphreys will deliver the presidential address, which will be followed by a reception. A business meeting will be held on Wednesday morning, followed by sessions of the sections on gas power, machine-shop practice and textiles. Wednesday afternoon will be devoted to reports of committees. On Wednesday evening there will be a dinner to Past-President John E. Sweet.

On Thursday morning simultaneous sessions will be held under the direction of sub-committees on railroads, iron and steel, and cement manufacturing. On Thursday afteroon there will be sessions devoted to power plant, and hydraulic and pneumatic apparatus. On Thursday evening there will be a banquet and dance. The final session will be held on Friday morning.

At the textile session papers will be included on power plants for textile mills. The session on railroads will include papers on train lighting and electric locomotives.

Mechanical Engineers to Visit Germany.

A meeting has been planned for the American Society of Mechanical Engineers in conjunction with the Verein Deutscher Ingenieure, to be held in Germany next summer, which will include a tour of the German industries. The date of departure from this country will be June 11 and the party will arrive on June 21. The meeting will open on June 23 in Leipsic. On June 25 the party will start on a tour of industrial Germany, visiting the principal cities, such as Dresden, Berlin, Duesseldorf, Cologne, Frankfort, Nuremberg and Munich. It is expected to include the Krupp works.

The final meeting will be held in Munich on July 7. The entire trip through Germany and the various official receptions are being arranged by a committee of the most prominent men in the German society, and the keenest interest is shown by municipal authorities and the heads of industrial establishments.

Meeting of Lewis Institute Section.

At a meeting of the Lewis Institute Section of the American Institute of Electrical Engineers on November 13, there will be an illustrated lecture on "The Physics of Electrical Conductors at High Temperatures." Charles P. Madsen, consulting electrical engineer, Chicago, whose specialty is electric heating, will be the speaker. The session will begin at 8:30 P. M., and will be open to the public.

New Wireless Station in Operation.

The new government wireless station at Arlington, Va., across the Potomac River from Washington, which is the most powerful in the world, was placed in operation on the night of October 28.

The new station has three huge steel towers, one of which is 600 feet high and the others 450 feet, arranged in a triangle. Twenty-three wires form the antenna. At the base of the towers are sound-proof rooms for the operators, living quarters for the operators and barracks for the marines who are kept on guard at the station. The power equipment comprises a 100-kilowatt motor-generator set, energy for which is obtained from the central station in Washington. The cost of the station was over $1,000,000.

The radius of the new plant is estimated at 3,000 miles. Communication will be made made with Key West, Colon, Guantanamo and ultimately with Hawaii, Samoa, Guam and the Philippine Islands. It is also expected that communication can be carried on with the powerful station at Clifton, Ireland, and with the Eiffel Tower at Paris It is proposed to make use of an exchange of signals with the latter station to exactly establish the difference of longitude of the two stations. The last determination was by cable in 1872.

This station will place the Navy headquarters in touch not only with the naval coaling stations but with the war vessels at sea. The latter will be able to communicate with Washington by relaying messages to the nearest shore station.

The radio station at Newport, R. I., reported on the evening of October 28 that the messages from the new station were so powerful as to drown out all other signals.

Pittsburgh Section.

The first fall smoker of the Pittsburgh Section, American Institute of Electrical Engineers, was held on Saturday evening, October 26, in the Union Club. The officers of the section have been conducting a campaign for new members, and the smoker was primarily for the purpose of inducing non-members to take up membership in the organization.

Chicago Electric Club Has Big Week.

The usual weekly meeting on Thursday and an inspection trip to the controlling works and power plant of the Sanitary District on Saturday was the program of the Electric Club of Chicago, for the week ending November 2.

At the meeting on Thursday which was devoted to entertainment, Philip S. Dodd, of Cleveland, who was a guest of the club, was asked to make brief mention of the progress being made by the Society for Electrical Development, of which he is secretary.

Mr. Dodd stated that the Society had its inception with J. Robert Crouse a number of years. The original idea has been fostered and enlarged and at a meeting held in September plans for a comprehensive organization of National scope were adopted. At that time an Organization Committee was appointed, which has held three meetings. The Committee has formulated a systematic outline of work to be conducted by the Society, this work to be classified under three departments: (1) Advertising, which will be essentially an exchange for copy of all character useful by electrical interests; (2) press bureau, which will gather and disseminate electrical news for newspapers, trade papers, etc.; (3) cooperative local development department, which will assist central stations, contractors, etc., in solving their problems.

Mr. Dodd stated that the incorporation papers will be ready by November 18 at which time the Organization Committee will adopt by-laws. At present $130,000 has been subscribed for use by the Society. $250,000 is necessary before the plans made can be carried out.

On Saturday, November 2, 80 members of the Electric Club and their guests made a trip on the *Robert R.* down the Sanitary Canal to the controlling works and to the main power house of the Sanitary District of Chicago, at Lockport, Ill. The party was under the direction of N. F. Obright, vice-president of the club, and John R. Harmon, chairman of the Speakers' Committee. A buffet luncheon was served en route, and every one present had a very pleasant time.

Chicago Credit Men to Meet.

At the meeting of the Electrical Credit Men's Association of Chicago on November 21 there will be an address by Harold Almert, of the Department of Examinations and Reports of H. M. Byllesby & Company, on the subject "Public Relations of Public Utilities."

Ernst J. Berg.

In the preparation of the student of electrical engineering for his life's work, much depends upon the fundamentals he will absorb from those who are set over him as preceptors and guides. Fortunate indeed is the student who comes in contact with so virile and vigorous a personality as the subject of this sketch, Ernst J. Berg. Not only temperamentally, but by reason of a great knowledge of the methods of imparting instruction, is Professor Berg fitted to impart a store of wisdom to his students. He has had a remarkable experience in practical work, and close contact with the leaders in electrical science that marks him a distinct figure in the instructional corps of our modern system of schooling.

Ernst J. Berg,
Professor of Electrical Engineering, University of Illinois.

Professor Berg was born in Ostersund, Sweden, in 1871. Upon concluding his studies at the Royal Polytechnicum, Stockholm, he came to America in 1892, where he found employment with the Thomson-Houston Electric Company at Lynn, Mass. He worked there during two years under the direction of Messrs. Potter and Hewlett. Upon the consolidation of the Thomson-Houston Electric Company with the Edison Electric Company, the engineering staff of the Lynn works, including Dr. Berg, was transferred to Schenectady. Here he had the good fortune to become associated in his work with that great engineer and physicist, Charles P. Steinmetz.

At that time Dr. Steinmetz was preparing his now famous book entitled "Theory and Calculation of Alternating-Current Phenomena," and Dr. Berg was called upon as his assistant to help in the preparation of this material, thereby going to probably the most advanced school in mathematics that one could well attend. The next few years saw a great development in the use of alternating-current apparatus, and as a result almost countless numbers of alternators, induction motors and rotary converters were designed by him.

Dr. Steinmetz at that time became greatly interested in electrochemical processes and in the study of lightning, and as a consequence Dr. Berg again had great opportunity of familiarizing himself with this phase of electrical phenomena under propitious conditions.

Later on Dr. Berg became technical assistant to E. W. Rice, Jr., vice-president and technical director of the General Electric Company, remaining in that position as consulting engineer until 1909, when he left the company. Under the persuasion of Dean Goss of the College of Engineering of the University of Illinois, he took charge of the department of electrical engineering, where he has since labored with great success.

Meeting of the New York Electrical Society.

At the 313th meeting of the New York Electrical Society, held in the Doremus Lecture Theater of the Chemistry Building of the College of the City of New York, on October 29, Charles Baskerville, professor of chemistry and director of the laboratory, delivered a lecture on "The Chemistry of Tungsten," which was illustrated by exhibits of minerals, preparations, alloys, apparatus involving the use of tungsten, and by stereopticon slides showing the spectra of the rare metals and the results of a spectrographic study of the various tungsten filaments. Tungsten, discovered in 1781 by Scheele, is now obtained from hübnerite (a tungstate of mangnese), wolframite (a tungstate of manganese and iron), ferberite (a tungstate of iron), and scheelite (a tungstate of calcium). The mechanical concentration of these ores is relatively simple on account of the high density of all tungsten compounds. Metallic tungsten may be prepared from tungstic acid by reduction with carbon, calcium carbide, ferrosilicon, zinc, aluminum, and by electrolysis of the double chloride of tungsten and sodium.

In 1911, the United States produced 1,173 metric tons of concentrated tungsten ore, values at $500,247; 1,000 short tons of concentrate, worth $360,000, made up the output of the Boulder County (Colo.) field alone.

The use which makes tungsten mining on an extensive scale possible, is as an alloy for steel; 97 to 99 per cent of the tungsten is now used in the production of tool steels, armor plate, steels for permanent magnets, steels for magnetos, indicators, etc. Metallic tungsten is also used in the manufacture of crucibles, electric contacts, X-ray targets, sparking plugs, projectiles, and filaments for incandescent electric lamps. The Austrians have generally received credit for the invention of the tungsten lamp; this is incorrect, for an American, Turner D. Bottome, first conceived the idea that the metal tungsten possesses properties which render it especially suitable for a filament in 1887. The great drawback to the use of tungsten lamps has been that the filaments are usually very brittle (owing to the presence, usually, of tungsten carbide) and the loss from shock was great; but this is obviated when the filaments are made from ductile tungsten, as in the Mazda lamps.

Professor Baskerville reviewed critically the various processes which have been proposed and employed for the production of tungsten filaments, the processes of Kuzel, Auer von Welsbach, Siemens and Halske, Westinghouse, and Just and Hanaman; and pointed out that carbon lowers the melting point of tungsten, causing defects in the filaments upon use, in addition to imparting fragility. Thousands of filaments can be made from a pound of tungsten, so that the market for tungsten ores for this use is small indeed, even though 40,000,000 Mazda lamps are being manufactured annually.

Professor Baskerville presented the results of an elaborate chemical study

of tungsten lamp filaments. In this investigation, he was obliged to work with quantities as small as 0.0008 gram, and consequently used a Nernst microbalance. By spectrographic and microchemical means, it is possible to determine the degree of purity and nature of the contaminants of the various filaments; these differences were brought out on lantern slides and charts. A representative collection of tungsten lamps was loaned for the occasion by the New York Edison Company.

At the close of Dr. Baskerville's most interesting discourse, Alfred N. Goldsmith lectured on "Radiotelegraphy and Radiotelephony," with lantern-slide illustrations. Dr. Goldsmith, after describing in detail the Poulson radiotelephone set recently given to the College of the City of New York by Gano Dunn, stated that the arc converter used is fed with 600 volts, direct current, and furnishes alternating currents of frequencies of a million or more cycles per second. This alternating-current energy can be controlled by microphone transmitters and radiated.

After the lecture the members of the Society, adjourning to the radio-laboratory of the College, made an inspection of the equipment, radiotelephone messages and music being received in a reasonant circuit, and listened to by the visitors. The resources of the radio-plant were demonstrated by the students in the new course in radio-engineering, which is the first course of its kind in America.

Philadelphia Section Activities.

The first regular monthly meeting of the Philadelphia Electric Company, Section of the N. E. L. A. for the season of 1912-13 was held at the Franklin Institute on October 14. Preceding the meeting a dinner was held at the Continental Hotel, in which all of the speakers and a large number of the members participated.

B. Frank Day, chairman of the Section, presided. Addresses were delivered by Joseph B. McCall, president of the Philadelphia Electric Company, by President Tait and Vice-President Scott and by the president of the Pennsylvania Electric Association.

Mr. McCall called attention to the value of active participation in the work of the N. E. L. A. and urged members to keep up their attendance at these meetings.

Frank M. Tait, president of the N. E. L. A., spoke at length upon the future possibilities of the electrical industry and the part played by the N. E. L. A. to bring about the highest efficiency of the individual employees in the power and lighting companies. Mr. Tait recently visited various company sections throughout the country and has been in touch with the leading men in the industry. He states that the general sentiment throughout the country is that business is in better shape today than it has ever been before and feels that we are on the threshold of better oportunities, and that what has been done in the past five years is no comparison to what will be possible in the next three years. Endeavoring to learn whether we are getting near the saturation point in the expansion of our business, Mr. Tait said that he had come to believe that at the present time no one knows what saturation point is and that the future holds an opportunity for unlimited expansion. All of this he said has been made possible by the tremendous increase of more efficient generating apparatus, lamps, cheaper lighting rates, better and more efficient devices for using the current, but a great deal of it has been brought about by the education of the people in the more economical use of the electric current and the handling of the devices and also in the development of the electric motor proposition as compared with other types of devices, and in developing electric power possibilities. The great opportunities for the individual to advance in our industry and the possibilities for one to go as far as his capabilities will take him, were referred to. There is a dearth of men competent to perform the tasks at hand.

H. H. Scott, second vice-president, spoke of the work of the Membership Committee and the unprecedented growth of the Association. He stated there are about 90,000 employees in central stations in this country. Mr. Scott said that he had heard the complaint that college men have been given the preference in our industry. He said that up to last June, a year ago, there were about 30,000 graduates of electrical courses in all of the leading universities of the country. Of that number there were not to exceed 3,000 in central-station business.

Van Dusen Rickert, president of the Pennsylvania Electric Association, spoke regarding the future possibilities of the State and Section organization; showing how the individual employee may find in these organizations a ready means of education and advancement which otherwise would not be possible. He said that he hoped to see the day when every paper read is a competitive paper, when every man and every company in the State has a chance to present his brain's work before the Association. He spoke of how the Association, through the Public Policy Committee, is helping the industry in many ways; how they are reaching out to help the employee and his family.

W. C. L. Elgin, donor of a gold watch for the best paper presented before any branch of the Philadelphia Electrical Company Section for the year 1911-12, made the presentation, in accordance with the report of the Eglin Prize Award Committee, of a handsome gold watch to John V. Matthews, of the Meter Department Branch for his paper on "Three-Phase Systems and the Measurement of Three-Phase Power."

The first regular meeting of the Meter Department Branch of the Philadelphia Electrical Company Section was held on October 10, H. G. Duus occupying the chair. Through the kindness of the Westinghouse Electric & Manufacturing Company, four reels of motion pictures were displayed, showing operations in the Westinghouse plant and the electrical education of Mr. and Mrs. Thrifty. The time for the changing of the reels was relieved by a Victrola concert, which also accompanied the showing of the pictures. Demonstrations of the "Rules for Resuscitation from Electric Shock" were made with several of the members as subjects and demonstrators. Refreshments were served by the Good and Welfare Committee.

The first fall meeting of the Accounting Department Branch was held on October 8. The program comprised a selection from a large Victrola and two papers, one entitled "Functions of the Accounting Department," by R. A. Heubner, and another "The Relation of Machinery to Bookkeeping," by J. H. Nickell. There were demonstrations of the Hollerith tabulating system with several styles of adding machines and various other machines and devices used in connection with accounting work. Representatives of the manufacturers of the various machines were present and explained in detail the operation of each.

The first meeting of the Commercial Department Branch was held on October 28, Walter T. Dyre presiding. The subject of the evening was "Incandescent-Lamp Practice." This was a review of the paper and discussion as presented before the Sales Managers Convention at Association Island. The sales managers were impersonated by various members of the Commercial Department Branch and the result was a very instructive meeting. Joseph D. Israel reviewed his paper and discussion given at the convention.

Exports of Copper.

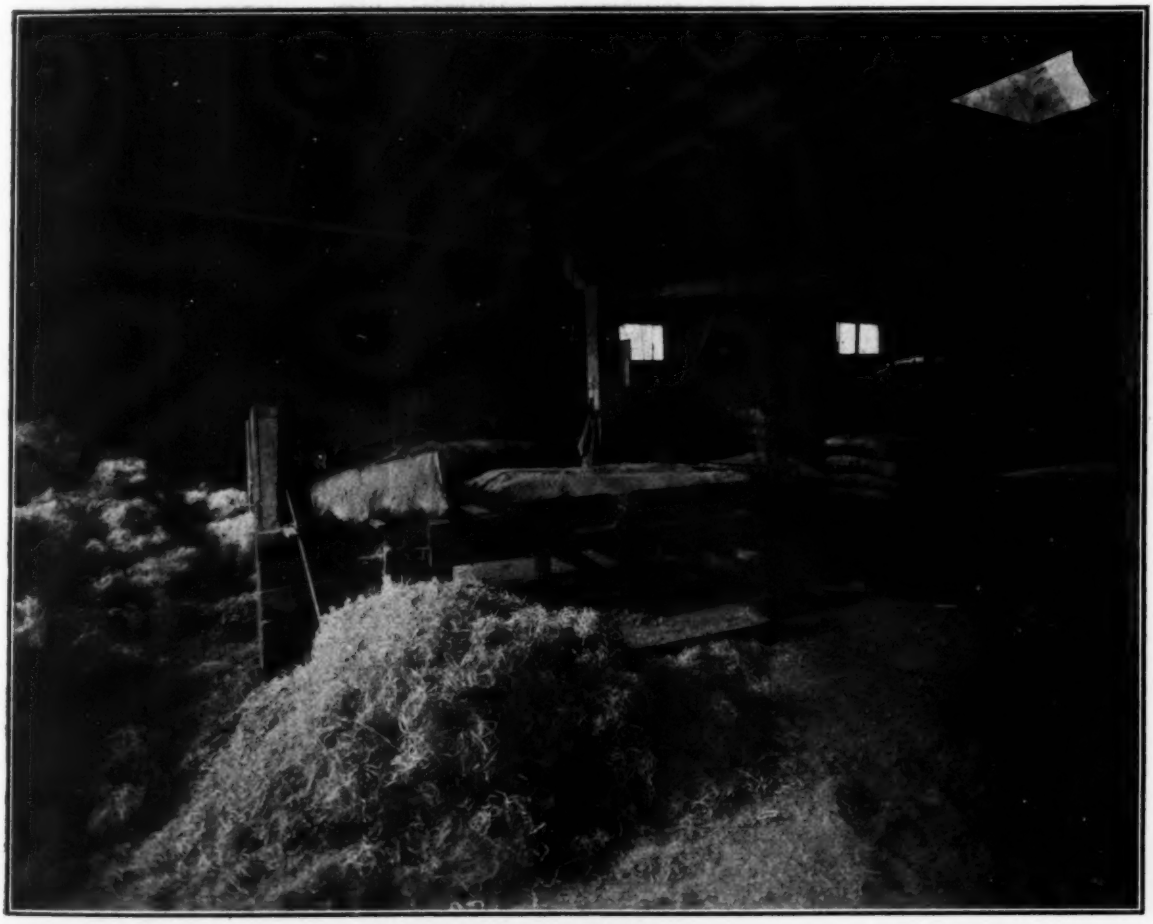
Copper exports for the week ending October 31 totaled 4,428 tons; since October 1, 24,670 tons; same period last year, 21,904 tons.

Electricity in Mattress Manufacturing.

Owing to the excessive amount of lint and dust inseparable from mattress-manufacturing processes, motor drive is the logical method of operation as it greatly reduces fire risk and cost of maintenance. Also, as is shown, central-station energy effects a considerable saving over steam power. Operating data from nine plants are presented in the data sheets.

The advantages of electric motor drive are nowhere so forcibly brought to the attention of manufacturers as in mattress factories. In this industry the reduction in fire risk obtained by the use of motors and the ability of the motors to operate satisfactorily under the adverse conditions found in such establishments are two items that are alone of sufficient importance to dictate the adoption of electric motor drive.

Regarding fire risk, if power is obtained from an adjacent steam plant the risk is great and the insurance rates correspondingly high. Mechanical drive necessitates either the dangerous proximity of the boiler room or steam generating machinery. The elimination of heavy line shafts greatly reduces the danger of fire from overheated journal boxes or from spontaneous combustion of accumulated waste and dust.



Mattress-Filling Machines at Empire Mattress Company.

heavy losses in long steam mains or rope transmission. If central-station power is used, all danger from adjoining power plant is removed. Electric drive not only does away with the inflammable lint and dust inevitably carried into the engine room by the large belt, but also makes possible the complete abandoning of all power and

It should be remembered that the rate charged by insurance companies, especially where steam boilers are in close proximity to the working machines, is exceedingly high, and that by installing complete electrical equipment in a modern fireproof building the annual premiums may be reduced from 7 or 8 per cent to three-fourths or one per cent. In many cases the saving in premiums has been sufficient to practically cover the original cost of the electrical equipment.

Much has been said of the ability of electric motors to operate continuously and satisfactorily under adverse conditions, requiring practically no attention and a minimum amount for repairs. In mattress factories this characteristic is of the utmost importance, as in portions of the plant excessive amounts of lint and dust cannot be avoided. However, it is desirable to mount motors on the ceilings and walls, whenever practicable, and in all cases the squirrel-cage induction motor is recommended. Direct-current motors should be either totally inclosed or provided with proper screens, except in those cases where they are ceiling-suspended, or located in a separately partitioned room, in such a manner as to eliminate fire risk.

The machines used in the mattress-manufacturing industry are comparatively few in number and require no special characteristics in the driving motors. The felt used in the majority of mattresses is made from rags which are run through what are known as shoddy pickers. In the average small establishment this operation is dispensed with, the baled shoddy being purchased. Cotton pickers loosen the fibers of this shoddy, the material being converted from a dense, matted mass into a light, flaky one. In manufacturing certain grades of mattresses this flaky fiber is blown from the pickers directly into the mattress ticks, otherwise it is taken to the carding or felting machines, where the fibers are drawn approximately parallel by a combing process and leave the machine as a roll of felt. Layers of this felt are then placed in the filling machines and by means of rollers, operated by motors, the filling is pressed to the thickness desired for the mattress and placed in the ticking. Excelsior and hair pickers, operating in the same manner as cotton pickers, are also usually found in mattress factories. No mention need be made here of sewing machines, which are also extensively used.

Conditions as regards the application of motors to mattress machinery and the saving resulting from using purchased power are admirably illustrated in a factory located in Arkansas. The motor installation comprises the following:

One 25-horsepower motor, 1,200 revolutions per minute, belted direct to horizontal coarse-cut excelsior machine, 209 revolutions per minute, manufactured by L. T. Kline Company. Capacity of machine, 400 pounds per hour.

One 5-horsepower motor, 1,200 revolutions per minute, belted direct to one vertical fine-cut excelsior machine, 175 revolutions per minute, manufactured by the Fischer-Davis Company. Capacity of machine, 200 pounds per hour.

Two 5-horsepower motors, 1,200 revolutions per minute, each belted to two felting machines, speed 202 revolutions per minute, manufactured by the Philadelphia Textile Company. Capacity of each machine, 160 pounds per hour.

One 5-horsepower motor, speed 1,200 revolutions per minute, belted direct to an excelsior baler, speed 172 revolutions per minute, manufactured by the Indianapolis Electrical Manufacturing Company. Capacity, 8 bales per hour.

One 3-horsepower motor, speed 1,800 revolutions per minute, belted direct to a Garden City exhaust fan operating at 1,000 revolutions per minute.

One 5-horsepower motor, speed 1,200 revolutions per minute, belted direct to a wooler, 390 revolutions per minute, manufactured by the Philadelphia Textile Company. Capacity, 300 pounds per hour.

Motor Driving Two Felting Machines.

One one-horsepower motor, 1,800 revolutions per minute, belted direct to mechanism of mattress hoist, speed 40 revolutions per minute. Capacity 60 mattresses per hour.

One 1.5-horsepower motor, speed 1,200 revolutions per minute belted to a line shaft driving four Union Special sewing machines. Capacity of each machine, 12 ticks per hour.

One-sixth-hosepower motor, speed 1,800 revolutions per minute, direct-connected to a Union Special sewing machine. Capacity, 12 ticks per hour.

One 3-horsepower motor, 1,800 revolutions per minute, belted direct to one cut-off saw, speed 1,000 revolutions per minute.

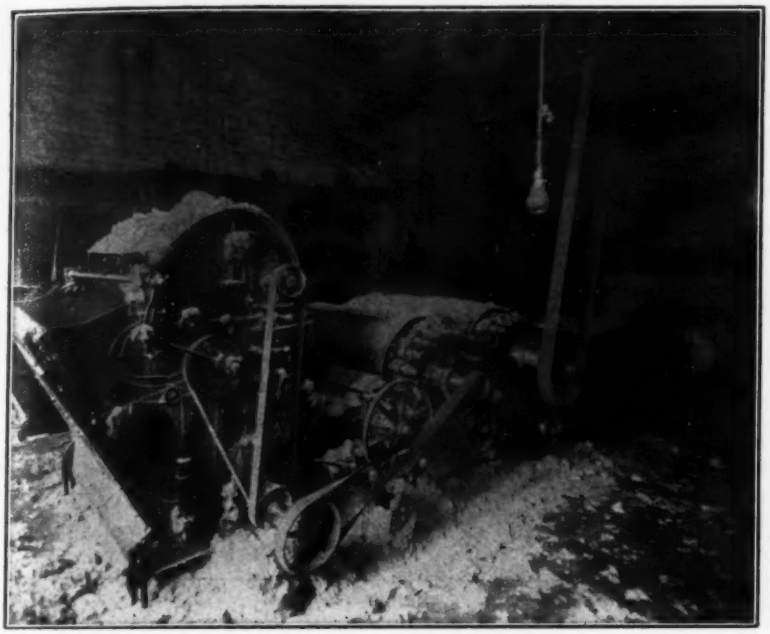
One one-horsepower motor, speed 1,800 revolutions per minute, belted direct to an emery wheel, 1,000 revolutions per minute.

Felting Machine and Willow.

One two-horsepower motor, speed 1,800 revolutions per minute, belted di-

rect to a stuffer. Capacity, 12 ticks per hour.

The capacity of this plant is 125 mattresses per day. The average



Motor-Driven Felting Machine.

monthly consumption is 3,120 kilowatt-hours, and the average bill for energy $95.22 per month. The former steam operating costs, taken from the company's books were $107.58 per month. Thus the saving in actual power costs in this plant amounts to $12.36 per month, or $148.32 per year. Tests on the cost of manufacturing a 40-pound mattress showed the electrical costs to be 1.7 cents, as compared with 3.08 cents using steam. This test did not take into consideration the time consumed which was considerably reduced by the use of motor drive.

In the foregoing discussion two of the more important advantages of motor drive in mattress factories were emphasized. There are innumerable other advantages, perhaps of lesser importance, but deserving of careful consideration, which can be classified under the following heads:

(1) Ease and economy of electric-power transmission.

(2) Flexibility of location of machines in the building.

(3) Accessibility of motor-driven machines.

(4) Wide choice of motors as to size, mechanical design and operating characteristics.

(5) Perfect control, including readiness of starting, stopping and making speed adjustment. Ability to control motors from a distance.

(6) Economy of power and time.

(7) Ability to operate any portion of a shop at any time with power consumption proportional to work done.

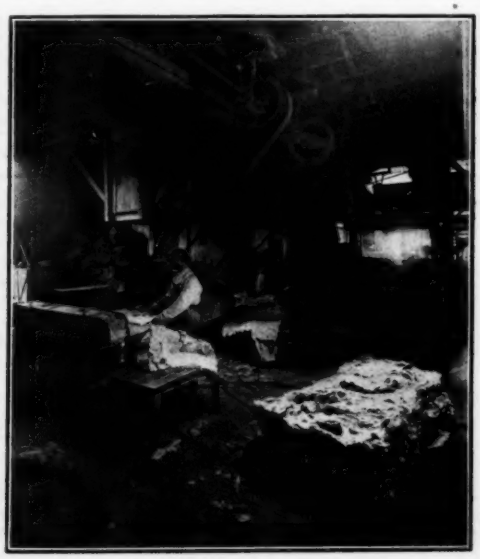
(8) Reduced hazard of fire and accident.

(9) Readiness with which tests and records can be made.

Industrial work generally requires the application of power at distributed points. No form of prime mover is available which can economically develop power in small quantities at the points of application. The electric motor furnishes the nearest approach to this condition in that electric energy can be economically transmitted and transferred into mechanical energy at the point of application in any quantity desired. When compared with line shafting and belts, the installation of wires for carrying electric current is a very simple and inexpensive operation; in comparing the relative losses in transmission the electrical losses seem almost insignificant.

With electric drive the location of buildings and of the individual machines in a shop is practically unhampered by considerations of power. Buildings can be placed with reference to good labor and transportation facilities, convenience with reference to each other, safety from fires or other disasters, etc., in any case electric energy is easily brought to the required location, the necessary wires being easily installed in space not valuable for other purposes. The machines in a shop can be placed so as to require

Motor Belted to Willow.



Motor-Driven Cotton Pickers.

(Continued on page 877)

Mattress Manufacturing Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Little Rock Mattress Company, Little Rock, Ark. This company manufacturers mattresses of various grades selling at from $1.50 to $10 each. The average output of the plant is about 150 mattresses per day. The average business amounts to $8,000 per month. Twelve men and four girls are employed, working 55 hours per week.

Total connected horsepower, 30. Total number of motors installed, 2. Average kilowatt-hours per month, 1,600.

Kilowatt-hour consumption for 12 months: November, 1,920; December, 2,030; January, 1,580; February, 1,780; March, 2,040; April, 1,920; May, 970; June, 760; July, 870; August, 1,860; September, 1,900; October, 1,580.

Load-factor, 9.8 per cent; operating-time load-factor, 21 per cent.

The electrical energy consumption per mattress manufactured is 0.4 kilowatt-hour.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	15	1,200	Squirrel-cage motor belted to shafting driving three Union Special sewing machines; one Singer sewing machine; one excelsior filler; and one excelsior picker. The capacity of these machines is 125 mattresses per 10-hour day.
1	15	1,200	Squirrel-cage motor belted to shafting driving two, two-cylinder, Smith & Furbush felting machines; and one Smith & Furbush wooler. Capacity, 65 mattresses per 10-hour day.

Energy is supplied by the Little Rock (Ark.) Railway & Electric Company.

Turner Bedding Company, Pine Bluff, Ark. This company has a daily output of 60 mattresses. Plant operates 60 hours per week.

Total connected horsepower, 63.5. Total number of motors installed, 6. Average kilowatt-hours per month, 703.

Kilowatt-hour consumption for 12 months: August, 980; September, 760; October, 1,150; November, 750; December, 580; January, 540; February, 800; March, 690; April, 450; May, 550; June, 540; July, 650.

Load-factor, 2.3 per cent; operating-time load-factor, 6 per cent.

The electrical energy consumption per mattress manufactured is 1.95 kilowatt-hours.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase 60 cycles, 220 volts. All motors are of the squirrel-cage induction type.

No.	Horse-power.	Speed R. P. M.	Application.
1	35	900	Belted to line shaft driving six 16-inch excelsior cutters.
1	20	1,200	Belted direct to felting machine.
1	5	1,800	Belted to cotton pickers, 25 heads per day.
2	0.25	1,750	Each direct-connected to a Singer factory-type sewing machine.
1	3	1,800	Belted to a line shaft driving one excelsior press; and one stuffing machine.

Energy is supplied by the Pine Bluff Company.

J. Osiason Mattress Factory, Fall River, Mass. This plant manufactures all grades of mattresses from the cheapest selling at $2.00 each to those selling at $30 each. The average weekly output is 300 mattresses per week. Running hours per week, 57.

Total connected horsepower, 11. Total number of motors installed, 3. Average kilowatt-hours per month, 250.

Kilowatt-hour consumption for 12 months: July, 210; August, 227; September, 243; October, 260; November, 327; December, 248; January, 193; February, 217; March, 222; April, 258; May, 318; June, 298.

Load-factor, 4.1 per cent; operating-time load-factor, 9.2 per cent.

The electrical energy consumption per mattress manufactured is 0.21 kilowatt-hour.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	1	1,800	Squirrel-cage motor belted to shaft driving four Singer factory-type sewing machines, No. 44-13.
1	5	1,800	Squirrel-cage motor belted to line shaft driving one mattress-filling machine, 54 inches wide; and one excelsior picker, beater shaft running at 888 revolutions-per-minute.
1	5	1,200	Wound-rotor motor belted to line shaft driving one mattress-filling machine, 54 inches wide; and two shoddy pickers, each running at 600 revolutions-per-minute.

Energy is supplied by the Fall River (Mass.) Electric Light Company.

Mattress Manufacturing Data—Sheet No. 2.

Southern Spring Bed Company, Atlanta, Ga. This plant manufactures a line of high grade mattresses, pillows, springs, etc. The average output of felt per month is 62,500 pounds; average amount of wire made into springs, 80,000 pounds per month; angle-iron handled, 25,000 pounds per month, cotton ginned, 25,000 pounds per month.

Total connected horsepower, 102.5. Total number of motors installed, 7. Average kilowatt-hours per month, 9,769.

Kilowatt-hour consumption for 12 months: October, 11,680; November, 10,460; December, 8,640; January, 6,740; February, 14,800; March, 7,900; April, 9,490; May, 9,250; June, 9,680; July, 7,830; August, 10,740; September, 10,020.

Load-factor, 17.4 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	1	1,800	Belted to line shaft driving six Union Special sewing machines.
1	5	1,800	Belted direct to a packing press.
1	15	1,200	Belted to a line shaft driving one J. Burton feather crusher, capacity 75 pounds per hour; one renovator, capacity 75 pounds per hour; and one Atlanta Utility Works waste-cleaning machine, capacity 900 pounds per hour.
1	50	850	Belted to a line shaft driving three Smith & Furbush felting machines, capacity 4,000 pounds per 10-hour day; one Continental cotton gin, capacity 450 pounds per hour; one 48-inch exhaust fan; two United Mattress Machine Company mattress-filling machines, capacity 250 mattresses per day; one Smith & Furbush willower, capacity 1,600 pounds per hour; and one 36-inch ventilating fan.
1	1.5	1,800	Direct-connected to Sturtevant blower.
1	15	1,200	Belted to line shaft driving wire-making machinery.
1	15	1,200	Belted to line shaft driving Bliss punch presses; and wire-making machinery.

Energy is supplied by the Georgia Railway & Power Company.

Northwestern Bedding Company, St. Paul, Minn. Manufacturer of springs and mattresses. Group drive. Running hours per week, 54.

Total connected horsepower, 16.5. Total number of motors installed, 6. Average kilowatt-hours per month, 744.

Kilowatt-hour consumption for 12 months: January, 469; February, 603; March, 650; April, 730; May, 598; June, 854; July 723; August, 833; September, 888; October, 969; November, 972; December 650.

Load-factor, 10 per cent; operating-time load-fact or, 28 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	1	1,800	Belted to line shaft driving six Singer factory-type sewing machines.
1	2	1,800	Belted to line shaft driving one mattress-filling machine; and one sewing machine.
1	3	1,800	Belted to line shaft driving one band saw; one spring winder; one drill press; one wire straightener; and one streching machine.
1	2	1,800	Belted to countershaft driving two wire-weaving machines.
1	1	1,800	Belted direct to one 4 by 6-foot feather renovator.
1	7.5	1,200	Belted to line shaft driving one excelsior machine; one hair picker; and one cotton picker.

Energy is supplied by the Consumers Power Company.

Colorado Bedding Company, Pueblo, Colo. Group drive. Average running hours per week, 48.

Total connected horsepower, 47. Total number of motors installed, 5. Average kilowatt-hours per month, 1,342.

Kilowatt-hour consumption for 12 months: January, 1,163; February, 1,241; March, 1,121; April, 1,089; May, 1,152; June, 1,023; July, 1,319; August, 1,572; September, 1,900; October, 1,707; November, 1,600; December, 1,217.

Load-factor, 6.15 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 440 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	5	1,800	Belted to countershaft driving one comfort sewer.
1	2	1,200	Belted to line shaft driving one carding machine; and one 6 by 10-inch air compressor.
1	10	1,200	Belted to countershaft driving one carding machine.
1	20	1,200	Belted to line shaft driving two cotton pickers; one Singer factory-type sewing machine; and one mattress-filling machine.
1	10	1,200	Belted to a line shaft driving one excelsior picker; and one cotton picker.

Energy is supplied by the Pueblo & Suburban Traction & Lighting Company.

Mattress Manufacturing Data—Sheet No. 3.

Louisville Pillow Company, Louisville, Ky. This plant manufactures a line of mattresses of various grades, pillows and comforts. The average output is 250 mattresses per 10-hour day.

Total connected horsepower, 167.5. Total number of motors installed, 12. Average kilowatt-hours per month, 10,886.

Kilowatt-hour consumption for 12 months: November, 14,380; December, 11,380; January, 9,100; February, 7,930; March, 10,880; April, 10,940; May, 7,760; June, 11,320; July, 12,910; August, 9,500; September, 10,830; September, 13,710.

Load-factor, 11.8 per cent; operating-time load-factor, 37 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
2	25	985	Each belted direct to a shoddy picker, drum 30 inches diameter, 26-inch face.
2	30	950	Each belted direct to a shoddy picker, drum 32 inches diameter, 26-inch face. Above pickers manufactured by Diamond Textile Machine Works.
1	5	1,200	Belted to line shaft driving Singer sewing machines.
2	10	1,200	Each belted direct to a felting machine, capacity 1,000 pounds per 10-hour day, each.
1	5	1,200	Belted to a countershaft driving one cotton picker; and one 30-inch fan. Capacity of picker, 800 pounds per hour.
1	5	1,200	Belted direct to a felting machine, capacity 100 pounds per hour.
1	7.5	1,200	Belted direct to excelsior picker.
1	5	1,200	Belted direct to mattress-filling machine.
1	10	1,120	Belted to a line shaft driving three cotton pickers, capacity 400 pounds per hour, each.

Energy is supplied by the Louisville Lighting Company.

Small mattress plant having an average output of 40 mattresses per day. Nine men are employed working 9.5 hours per day.

Total connected horsepower, 8. Total number of motors installed, 2. Average kilowatt-hour consumption per month, 292.

Kilowatt-hour consumption for 12 months: January, 191; February, 203; March, 155; April, 207; May, 261; June, 295; July, 249; August, 325; September, 344; October, 345; November, 395; December, 432.

Load-factor, 6.7 per cent; operating-time load-factor, 19 per cent.

The approximate electrical energy consumed per mattress manufactured is 0.3 kilowatt-hour.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is two phase, 60 cycle, 220 volts and single-phase.

No.	Horse-power.	Speed R. P. M.	Application.
1	0.5	1,200	Belted to 15-foot shaft, 362 revolutions per minute, driving three Singer sewing machines. Single-phase motor.
1	7.5	1,200	Belted to 32-foot shaft, 336 revolutions per minute, driving one straw twister; one Thompson 22-inch diameter cotton picker, 692 revolutions per minute; one 20-inch blower, 1,447 revolutions per minute; one Thompson excelsior picker, 16-inch diameter, 1,154 revolutions per minute; one Wareham mattress stuffer; and one Singer stitcher.

Empire Mattress Company, Chicago, Ill. This plant manufactures high grade mattresses, the average output being 500 mattresses per week. Running hours per week, 57.

Total connected horsepower 37.5. Total number of motors installed, 6. Average kilowatt-hours per month, 3,791.

Kilowatt-hour consumption for 12 months: November, 2,153; December, 2,751; January, 1,660; February, 4,548; March, 5,561; April, 4,502; May, 4,155; June, 4,097; July, 3,386; August, 3,962; September, 4,414; October, 4,304.

Load-factor, 18.6; operating-time load-factor, 61 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	10	1,200	Belted to a 16-foot line shaft driving two Smith & Furbush felting machines, capacity 150 pounds per hour, each.
1	7.5	1,700	Belted to a six-foot shaft driving one condenser, capacity 600 pounds per hour; and one No. 5 Sturtevant blower.
1	10	1,700	Belted to line shaft driving one Smith & Furbush felting machine, capacity 150 pounds per hour; and one willow, for cleaning and mixing stock.
1	5	1,200	Belted to 20-foot line shaft driving two cotton pickers; and one hair picker, capacity 500 pounds per hour.
1	3	1,700	Belted to line shaft driving 14 Union Special and Wheeler & Wilson factory sewing machines.
1	2	1,700	Belted to line shaft driving one excelsior picker; and four mattress-filling machines.

Energy is supplied by the Commonwealth Edison Company.

minimum handling of material and to obtain most economical production; also better light and ventilation can be given proper consideration. No matter how remote or inaccessible the corner in which the work is to be done, the motor-driven machine can fill the requirements.

The flexibility extends to the rearrangement of machines to conform to changing manufacturing requirements. A motor-driven machine can be moved from one location to another as a unit without disturbing or interrupting any other machines. The only changes required on account of the power supply are the disconnection of the electric conductors in the old location and their reconnection after the machine is moved. This process is extremely simple compared with that of relocating shafts and belts. The best arrangement for maximum productive economy can thus be maintained, under changing manufacturing conditions.

Additions to plants employing motor-driven machines and central-station service require very little consideration on account of power, other than the wiring. The station is nearly always prepared to supply the additional power as soon as the manufacturer secures the machines and the necessary floor space. The latter can frequently be provided by rearranging the other machines.

With motor drive the machines become more accessible and the operators are unhampered by the close proximity of countershafts and overhead belts. The freer head room permits easier handling and storage of material, besides improving the lighting.

Electric motors are standardized in sizes, shapes, and with operating characteristics suitable for almost every conceivable application. A motor selection for any given application can nearly always be made from standard products, but the principles of design are so well known that a motor with special mechanical or electrical features can be developed with practical certainty of meeting any special set of conditions.

By the use of a motor for each machine any machine can be shut down when not in use, thus stopping all wear and loss of power in friction. This is not the case with the line-shaft drive, as the wear and the friction losses in the shafting are only slightly less when all the belts are on their loose pulleys than when all the machines are working. This possibility of saving power with motor drive is an argument for the use of individual motors on the various machines or groups of machines. Each machine thus driven is an independent unit; group drive makes each group totally independent of all other groups. Hence in the case of over-time work, only the machinery required need be operated.

A motor-driven machine consumes energy only while operating, and then only in proportion to the work done. Electric motors are very efficient machines in all sizes and at all loads within the ordinary working range, which is more than can be said of any small prime mover. The use of motors moreover eliminates some or all the losses due to friction of line shafts and belts. These losses consume anywhere from 30 to 60 per cent of the energy required to operate an ordinary shaft-driven shop or mill, and they are continuous, even though only a few of the machines are operating. Very few machines are in actual service more than half of the time, the cessation of all energy losses chargeable to each machine, except while it is in productive operation, constitutes a very large saving in power.

Commercial Practice
Management, Rates, New Business

Features of Kentucky Electric Company's New Home.

Two very interesting features have developed from the removal of the executive, commercial and contract offices of the Kentucky Electric Company, of Louisville, Ky., to the handsome new "Ky-El-Co" building at Fourth Avenue and Chestnut Street in the Gateway City. One of these is that, within eight weeks, what is claimed to be the second largest electric sign in the country will surmount the roof of the three-story building which houses the company's executive departments. The other is that $50 in gold is to be given for the most suitable name suggested for the new "Ky-El-Co" home.

The "Ky-El-Co" sign is to be one of the wonders of the entire South when it is completed. The gigantic frame-work for the sign, with a span of 56 feet between the supporting columns and a depth of 35 feet, the topmost girder of the steel frame being more than 100 feet above the street level, is now being erected. Three thousand four hundred incandescent lamps will compose the display and it is to be finished in natural colors so that it will show up as imposingly by day as by night.

"The story of electricity in the home" is to be told. Four installments will contribute the story, each chapter being related in a big circle in one of the four quarters of the sign. The upper left-hand circle will show a woman, in a cosy home, reading under an electric light in a room that is heated by electricity. She will rock back and forth at perfect ease.

The second circle will portray her busy at her machine, with the needle darting back and forth in time to the revolutions of a small motor operating the device—illustrating the first aid of the electrician to the seamstress. The third chapter will show a woman doing Tuesday's work with an electric iron, and the fourth will illustrate the use of the electric vacuum cleaner, with a woman pushing a dust-chaser easily back and forth across a handsome carpet. Because of the relatively small size of many objects to be shown, the electric iron and the sewing machine, for instance, all of the figures in the story are to be proportioned along the heroic scale. In the center of the sign there is to be an incandescent lamp 10 feet high and 5 feet in diameter, a veritable searchlight. Sputtering motors shooting electric sparks are to further ornament the display. Auxiliaries to the sign will be the phrases "Kentucky Electric Company," "Ky-El-Co Light" and "Ky-El-Co Power," spelled in three-foot letters shaded by a patented wire mesh which serves to diffuse the light, making the appeal more pleasing to the eye.

The sign is to operate automatically. One chapter will flash up after another, at intervals of one minute, and the space of five minutes will be required to complete the tale, after which the lights will flash out and the dynamos will flare up, until the story

is re-told. Situated many feet above the street, and facing the greatest length of Louisville's chief retail business thoroughfare, the sign will be visible to tens of thousands of people daily and nightly and will be one of the first objects to be seen by passengers upon incoming trains over the Big Four and Pennsylvania bridges. The sign will weigh about 30,000 pounds complete, and will require 75 horsepower to operate. The entire ornament will cost more than $5,000.

In originating a contest for the christening of its new home, the Kentucky Electric Company has gained much distinction in the Bluegrass metropolis. Not long ago someone suggested to Robert E. Hughes, president of the company, that the new Ky-El-Co office building should be supplied with an appropriate name. President Hughes welcomed the notion and has announced that five prizes will be awarded by his company to those persons suggesting the five most appropriate names. The cognomen which will be adopted officially and by which the building will be known is to receive a reward of $50 in gold. Inasmuch as the company desires to have synonomous names which may be used in the advertisement of its offices, other prizes of an electric chafing dish, a coffee percolator and a couple of other extremely desirable domestic utensils are offered.

The company will close the contest in a few days, for the formal opening of its home is to be celebrated shortly. The contest has aroused a great deal of interest in Louisville, and several hundred suggestions have been received from those who believe that they know just what the new office building should be called. The "Ky-El-Co" officers and clerical force are now ensconced in their new quarters, but considerable interior outfitting remains to be completed.

In connection with the opening of the new offices of the Kentucky Electric Company, of Louisville, Ky., President Robert E. Hughes was host at a newspaper dinner on Hallowe'en, shortly after the big establishment was thrown open to the public. Representatives of the daily and trade press were invited, and a sumptuous banquet, every portion of which was electrically prepared, was served. Mr. Hughes, impressed upon his guests that, as a newspaper man, he had often been assigned to "cover" a banquet featured more by oratory than by food and the height of the executive's ambition seemed to be realized at an affair where speeches were discounted in favor of a bountifully spread board.

Rate Research.

The first four numbers of the new publication of the Rate Research Committee of the National Electric Light Association have made their appearance, and the paper gives promise of being quite valuable to the officers of the member companies who are following rate and rate-regulation matters.

While the Rate Research Committee will devote most of its attention to the theory and practice of electric rates and the filing of rate schedules, *Rate Research* covers a more extensive field, reporting all matters of rate regulation by commissions and courts which would throw light upon cases of an electrical nature.

The second number contained a reprint of John Hopkinson's original paper, "On the Cost of Electric Supply," and this was followed in the next number by a short biography of Dr. Hopkinson. It is rather surprising that, as well known as Dr. Hopkinson's paper has become in the last decade, very few electrical men are familiar with the important position that Dr. Hopkinson occupied in England from 1880 to his death in 1898. It is understood that the paper by Dr. Hopkinson will be followed by other rate papers, such as the one by Arthur Wright, and this series should be of much interest to central-station men throughout the country.

Most of the companies are interested in what the various commissions have had to say relative to electric rates, and in the third number of *Rate Research* the most important decisions of the Wisconsin Commission are collected. In the next issue the Massachusetts decisions were taken up and these will be followed by the other commissions now having jurisdiction over electric rates.

The Rate Research Committee has developed a classification of all matters which are considered to have a bearing upon electric rates or rate regulation, and in the first number this classification was printed in full. All items as they are published are labeled according to this classification, so that reference is easy, and each number is a running index in itself.

The technical electrical literature of today is so voluminous that very few company officials have time to thoroughly read over such items as might interest them. In the last two or three pages of *Rate Research* are given the important current rate references, with some indication of the extent and value of the article, so that those interested in electric rate matters can refer to the articles that may be of particular interest to them. This is an interesting departure from the usual bibliography, which gives no indication of the relative value of the articles quoted.

Result of a Grill Campaign.

Recently 22 of the smaller Byllesby properties held a campaign of one week's duration to place electric grills. Reports received show that 174 grills were placed during the period, the majority of which were sold directly through the newspaper advertising employed, although in some few cases personal solicitation which followed newspaper advertising was responsible for sales. The plan followed was a coupon scheme, making it necessary for the purchaser to present a coupon clipped from one of the advertisements in order to secure the reduced price on the grill. Besides the number of grills sold, inquiries were received from approximately 150 other people, and since the campaign, 20 grills have been sold in a number of cases of which the sales were directly traceable to the newspaper campaign. At one property the campaign was an entire failure, but the San Diego Consolidated Gas & Electric Company, San Diego, Cal., and the Oklahoma Gas & Electric Company, Oklahoma City, Okla., each disposed of 32 grills.

"Made in Minneapolis" Week.

The Civic and Commerce Association of Minneapolis, which is promoting "Made in Minneapolis" week, expects to have at least 500 exhibits of Minneapolis made goods in the business district. General Manager Pack of the Minneapolis General Electric Company has donated all the power needed for the operation of exhibits during the week, and in addition, all the lighting necessary to make the exposition a "brilliant" success. Arrangements have already been made for the electric operation of 100 working models of manufacturing processes on the streets and in the windows of the retail stores.

The company will have in its window an electric freight train in operation. On this train will be loaded various products of Minneapolis manufacturers, and as the Minneapolis *Tribune* of October 15 said: "The train will carry them over hills and prairies and through tunnels to all parts of the country illustrating the extent of the markets which Minneapolis now serves with high quality goods."

Denver Company Pushing Trucks.

Through the efforts of the electric vehicle department of the Denver Gas and Electric Light Company the sale of electric trucks seems to be gradually on the increase. Recently three machines were sold in one week. The Rocky Mountain Fuel Company, one of the largest coal companies in the city, made its initial investment in electrics when it purchased a six-ton GMC

truck. The Denver branch of the Western Electric Company has also issued an order for a 2,000-pound machine of the same make and the Vienna Model Bakery has purchased a 1,000-pound Hupp-Yeats car. The week before these orders were taken the Daniels and Fishers Stores Company, a large department store, added another electric to its delivery fleet. This concern now has three electrics in service, and the fact that it is continually adding cars of this kind to its transportation service seems to indicate that the electric is doing very good work.

The American Express Company has displaced 3 two-horse teams with 2 two-ton Baker electrics. One other nationally known express company has about completed arrangements for the installation of 20 machines in Denver. These cars will take the place of all the horses and wagons, and plans for the erection of a model electric garage in which to house these cars are being prepared. It is not definitely known what make of electrics will be employed by this express company.

Power Required for Turntables.

A committee of the Association of Railway Electrical Engineers has compiled the following table of power requirements from tests conducted in the interests of the Association.

MOTOR INPUT FOR TURNTABLES.

69 Foot Table—		
Idle		4.5 kilowatts
Turning Engine approximately pounds	Weighing 300,000	10. kilowatts
Turning Engine approximately pounds	Weighing 266,000	10.3 kilowatts
80 Foot Table—		
Turning Engine approximately pounds	Weighing 210,000	5.6 kilowatts
Turning Engine approximately pounds	Weighing 300,000	9.6 kilowatts
100 Foot Table—		
Turning Engine approximately pounds	Weighing 526,000	32 to 24 kilowatts

Time required to turn engines approximately one minute.

Advertising Electric Signs.

An unique method of advertising electric signs was recently used by the Denver Gas and Electric Light Company. The company employs the front of its building directly above the show windows on the first floor for advertising its different wares by means of a changeable sign. New advertising appears every month.

Recently this sign was used for advertising electric signs and by contrasting the illuminated sign with the dark one the value of the former after dark was efficiently brought out. The sign read: "Illuminated Signs Always Attract Attention. It Is Hard to See the Sign in the Dark." The last word—dark—was not lighted and when a person easily read the lighted sign and was forced to look closely for the word completing the last sentence, the value of the illuminated sign for advertising purposes after dark was quickly conveyed to him.

Denver "Home Industry" Sign.

The accompanying illustration shows the sign as it was used to advertise "Home Industry Week."

Cost of Electric Delivery.

The Chapin & Sacks Manufacturing Company of Washington, D. C., manufacturer of ice cream, has 15 electric vehicles, 14 of which are 2,000 pounds capacity, one of two-ton capacity. The total maintenance figures of these machines are given below.

Tires, one year	$1,795.79
Batteries, one year	1,657.09
Vehicle repairs, one year	1,483.97
Labor, one year	2,625.31
Chains, one year	321.94
Incidentals, one year	577.78
	$8,461.88
Average yearly cost per wagon	$564.12
Average monthly cost, 15 wagons	705.15
Average monthly cost per wagon	47.01
Average daily cost per wagon(30 days)	1.56
Average daily cost per wagon, including current	8.08

Driver's wages at $15 per week, insurance and depreciation not included in above.

These machines make 40 miles daily without a boost, and with a boost between deliveries, cover from 50 to 65 miles when the day extends over the usual nine or ten hours. They reported as high as 72 miles in one day, covering about 20 hours, in the busiest part of summer.

A Salable Central-Station House Organ.

The Louisville (Ky.) Lighting Company is probably unique in that it publishes a house organ which the public at large is willing to purchase. Since A. T. Macdonald, general sales manager of the company, assumed the editorship of *Chained Lightning*, bringing to it a wide newspaper experience, the demands for copies have increased at such a rapid rate that the problem of distribution has become a serious one. Recently, as an experiment, a number of copies were placed with local newsdealers for sale and to the surprise of the company over 50 copies were sold the first day.

While this action on the part of the public is perhaps without precedent, those familiar with *Chained Lightning* see nothing unusual in the popularity of this publication. Its mission, of course, is to bring the customer and the company in closer personal touch—describing electrical installations of customers on the one hand and the policy of the company on the other. All electrical subjects are treated in a popular and understandable manner, but aside from the more serious features of the publication Mr. Macdonald succeeds in collecting unusual photographs of popular subjects, and a mass of humorous and witty copy, both of which are generously interspersed with the purely electrical text.

So thoroughly does this little publication fulfill its mission that several central-station companies, in no way connected with the Louisville Lighting Company, have applied for permission to distribute it to their customers, but so far all such requests have been refused.

Pumping Rate In Paris.

The City Council of Paris, Ill., has contracted with the Central Illinois Public Service Company for power for lighting the streets and pumping water at a rate of 2.5 cents per kilowatt-hour for the first 20,000 kilowatt-hours and two cents per kilowatt-hour for all additional energy.

Aging Cheese.

A Dutch farmer claims to be able, by passing a current through them, to mature cheeses in 24 hours. The process has hitherto been very slow.

Electrical Construction

FIRE ALARM SYSTEMS.—II.

Automatic Alarms Over Telephone Lines.

The first article of this series was a description of a fire alarm and watchman service system in one of the large railway passenger stations of Chicago. The present paper undertakes to explain the more interesting details of a system in operation in Rochester, N. Y., in which system fire-alarm signals are transmitted automatically over telephone lines. The provisions which make such service as this successful give the system an element of uniqueness sufficient to cause an investigation of it to be especially interesting. At the same time such a study involves enough consideration of characteristics essential to any good fire-alarm installation to make the study of this particular system worth while, it is thought, to the student of fire-alarm systems in general.

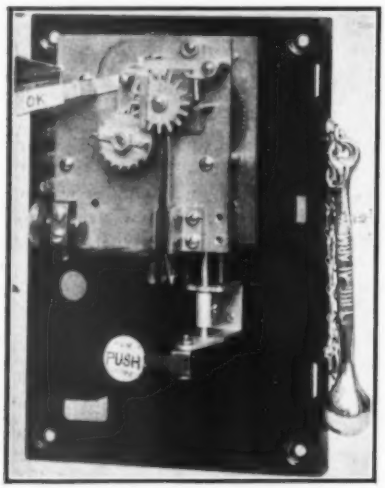


Fig. 1.—Interior of Transmitter.

The system to be described here, which is manufactured by the American Telephone Fire Alarm Company, of Chicago, successors to the Denio General Electric Company, may be operated on the standard type of manual telephone installation, in which telephone connections are made by switchboard operators at the telephone exchange, or it may be connected on the lines of an automatic telephone service which does its work without any switchboard attendant. Operation on a manual telephone installation will be described first.

The equipment for service of this sort consists essentially of a transmitter, or call box, installed at the point from which it is desired to be able to send alarms of fire, the proper signaling apparatus at the telephone switchboard for calling the attention of the operator there to the incoming alarm, suitable plugs on the telephone switchboard for connecting the transmitter with fire headquarters and, finally, a reliable equipment of apparatus at fire headquarters for sounding the alarm and indicating the location of the fire. At the exchange, the regular telephone equipment is used, no change being made in the line or cord circuits. The additional equipment here consists of two fire plugs, connected to fire headquarters, for each operator. The employment of other auxiliary equipment, such, for instance, as that necessary to take care of the service when telephone line troubles occur, is incidental to the operation of the system, of course. The character of some of this auxiliary apparatus will appear in the course of this article.

Fig. 1 is a photograph of the interior of a transmitter, or call box, in the system under consideration, while Fig. 4 shows a transmitter complete and as it appears when installed and ready for service. Fig. 2 is a sketch indicating the arrangement of the parts of the transmitter more clearly than is possible in a photograph.

In one of these boxes there are two metal plates separated from each other sufficiently to accommodate a train of gears. The front plate is shown in Fig. 1. The gears mentioned are operated by clock work, the arrangement being such that while the clock movement is kept wound up as it should be the letters "OK" are conspicuous in a window at the upper left-hand corner of the transmitter box, while when the box is transmitting a signal or when it needs winding a red sign appears in the window.

The clock movement is set going when the push-button at the bottom is pushed; or it may be released by the operation of the electromagnet shown in the lower part of Fig. 2. Where there is but one signaling station in the plant protected by the alarm, a transmitter box of the push-button type is employed; but in a large building where arrangements are wanted for sending in alarms of fire from any one of several points, electromagnetic release is used in the transmitter. The latter condition usually obtains in large factories. The transmitter is located at any convenient point, and circuits run from it to push-button controlling stations installed in the desired places. Both push-button and electromagnetic release are not employed in the same box, of course.

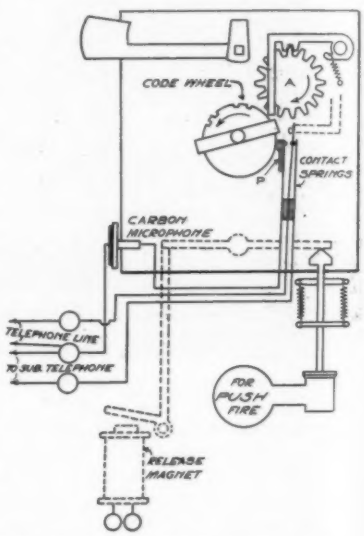


Fig. 2.—Sketch of Transmitter Parts.

The left-hand wheel of the two wheels seen in front of the front plate in Figs. 1 and 2 is called the code wheel, and it is operated by the train of gears between the plates. As it turns, the ends of the metal bar across the outer surface of it lift the lever shown resting on the top of the toothed wheel just above the code wheel. The function of the lever, as is clear from the figures, is to prevent the toothed wheel from turning except when the lever has been lifted. While the lever is momentarily held up by the code wheel a cam on this wheel turns the toothed wheel through the distance of one tooth. The first movement of this wheel (wheel *A* in Fig. 2) causes the middle one of the three metal springs arranged vertically

below wheel *A* to separate, at its upper end, from the end of the right-hand spring and make electrical contact with the left-hand spring. This movement of the middle spring cuts the subscriber's telephone out of circuit and throws the transmitter on the telephone line for sending the fire signal to the operator at telephone central.

The operator's attention is attracted by a flashing signal and by the noise transmitted from a carbon microphone which has been automatically cut into circuit. Having received this signal, the operator makes connection between the fire-alarm transmitted and fire headquarters by inserting the proper fire plug in the switchboard.

The circuits are arranged at the telephone switchboard so as to avoid confusion there when an alarm of fire comes in.

The left-hand one of the three upright springs in the fire-alarm transmitter has an insulating projection, *P*, at the top of it which rests against the peripheral surface of the code wheel. Hence, since portions of the periphery of this wheel are cut away, the upper end of the spring moves back and forth as the code wheel rotates, breaking the contact with the middle spring and then establishing it again. Thus electric currents of momentary duration are transmitted to fire headquarters, and these operate a punching register and a tap bell there. When the circuit is closed the punching register makes a perforation in a paper tape, and there is, at the same instant, a stroke of the alarm bell. The number and sequence of these perforations and strokes indicate the location of the fire. The number and sequence of the current impulses depend, of course, upon how the edge of the code wheel is cut, and no two wheels in any given locality are cut in the same way.

When the tooth wheel, *A*, referred to above finishes a complete revolution it automatically forces the upper end of the middle contact spring back into contact with the right-hand spring, thus removing the fire-alarm from the telephone line and cutting the subscriber's telephone back into circuit. Before this occurs, however, the alarm signal has been repeated sixteen times at fire headquarters.

The contact springs and the code wheel of a transmitter are shown rather well also in the lower left-hand corner of Fig. 3. The code wheel is represented with three notches cut in it. The carbon microphone is shown slightly below and to the left of the code wheel. As the figure is drawn, the local telephone is in circuit. It is easy to see how it is cut out by the action just explained.

The rest of Fig. 3 represents diagrammatically a portion of the equipment for the protection of a factory building with the system under consideration. The operation of the alarm is essentially as follows: The person turning in the alarm at the factory closes a local circuit by means of the push-button G_2. Magnet n_2, at the bottom of the figure, is thus caused to release the transmitter clock movement, and a signal goes immediately to the telephone switchboard in the manner explained. Electromagnets P_2 and

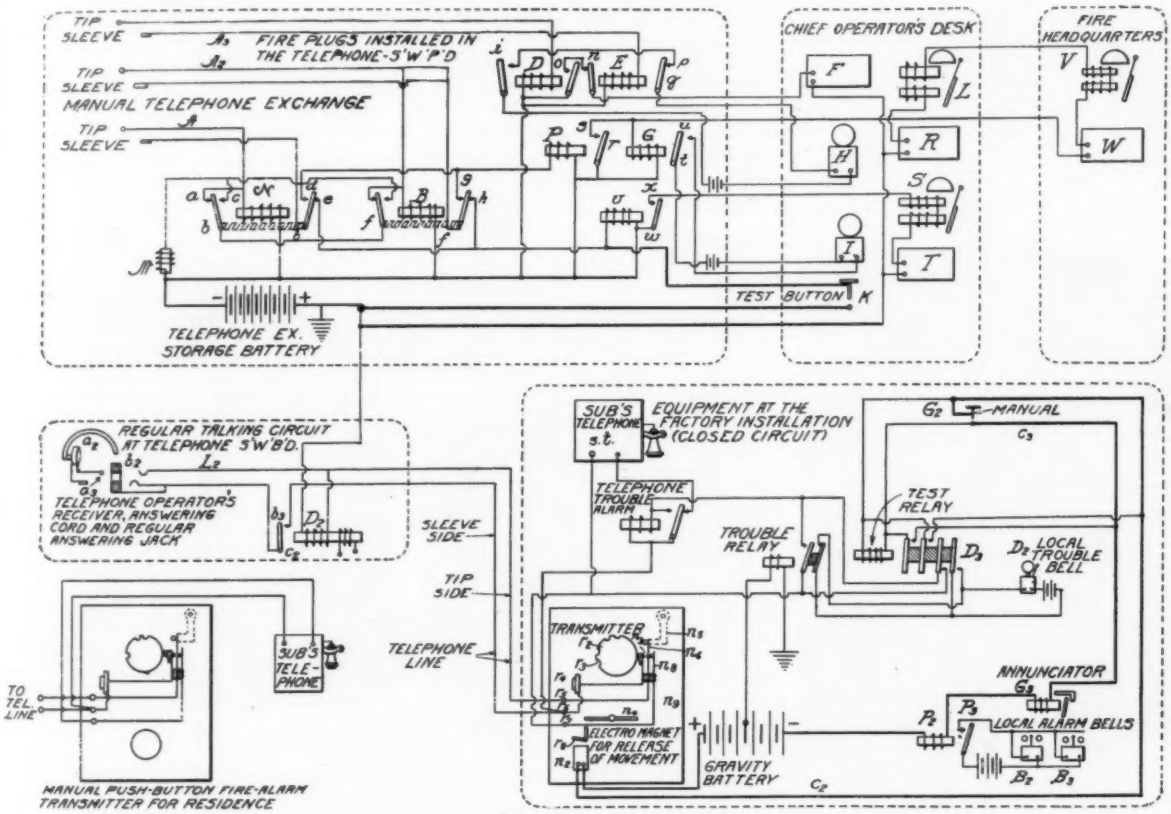


Fig. 3.—Diagram of Connections for Factory Installation.

G_2 act at the same time to cause alarm bells in the factory to ring and the annunciator shown in Fig. 3 to indicate to attendants in the factory from which floor the alarm was sent in. When the telephone operator gets the signal, she inserts a fire plug *A* (see upper left-hand part of Fig. 3) in the jack b_2. A circuit is thus established from the positive pole of the telephone exchange battery through the relay D_2, the tip side of the line L_2, the tip side of the plug *A*, through the relay *N*, and back to the negative side of the telephone-exchange battery. Thus the armature *b* is caused to close the circuit at *c* and open the circuit at *a*, contact being broken, at the same time, at *e* and es-

tablished at *d*. The armature c_2, on magnet D_2, closes the gap at b_3. A circuit has now been established so that the relay *P* (upper central part of the figure), which controls punching registers located in the telephone exchange and fire headquarters begins to work in step with current impulses timed by the fire-alarm transmitter. The path of the current is from the positive side of the telephone-exchange battery through relay D_2, to the tip side of the telephone line, to the terminal r_3; then through the transmitter to the sleeve side of the telephone line; then through jack b_2, sleeve side of plug *A*, through the armature of relay *N*, to relay *P*, and back to the negative side of the telephone-exchange battery. The armature *r* of the relay *P* closes the circuit of the tap bell and registers in the fire headquarters, the path of the current being from the telephone exchange battery through the register *R*, the tap bells *L* and *V*, the register *W*, the contact *s* and back to the battery.

Fig. 4.—Call Box in Service.

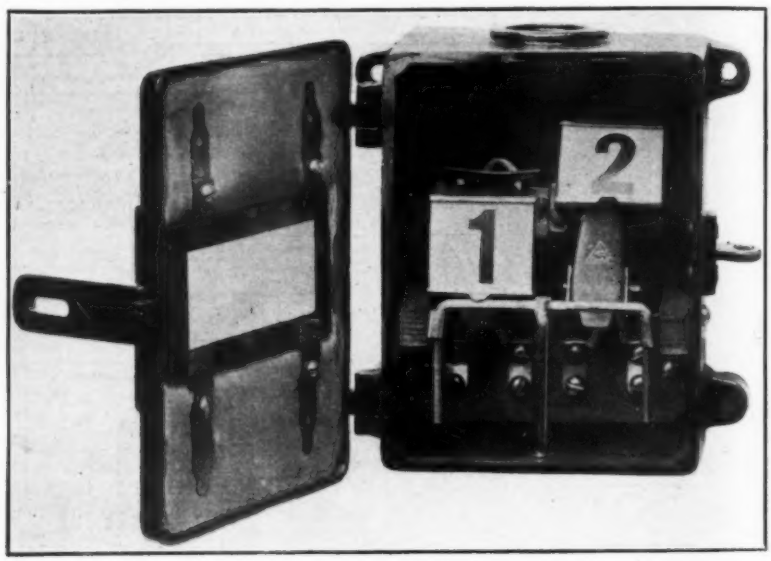


Fig. 5.—Annunciator.

From the above it is seen that, in the case of this factory, punching-register records of the location of the fire are obtained both at fire headquarters and at the telephone exchange, in addition to the tap-bell signals received at these two points.

The annunciator shown in Fig. 3 is in the office of the factory. Fig. 5 is a photograph of this piece of apparatus.

When this fire-alarm system is operated in connection with the automatic type of telephone exchange there is an additional wheel, called the character wheel, in the transmitter box, and there are also groups of contact springs not found in the transmitter shown in Fig. 1. The operation of the character wheel and one set of contacts builds up a trunk line to fire headquarters as soon as an alarm is turned in, and then, through the code wheel, a repeater is put into action which controls the register and tap-bell circuit to fire headquarters. The entire procedure is essentially as follows.

When the push-button is operated the transmitter movement is released, the wheels controlling the contact springs are set in motion, and the arrangement of the contact springs is changed to bring about results which may be enumerated in the following way: The first is to cut the subscriber's telephone out of service so that there will be no interference if an effort should be made to use the telephone while the fire-alarm box is operating. The next operation is to bring about the release of the regular automatic switches in the telephone exchange, to prevent interference if a telephone connection should be established at this time. A polarized relay is bridged across the line to lock the movement so that it cannot run down until the release of a connection (to this line from some other) has been made by the calling party. In some types of automatic-telephone systems the release must always be made by the calling party, and it is for this purpose that the polarized relay holds the movement locked after the telephone connection has been broken until the calling party hangs up his receiver. He has no alternative but to hang up to clear out his line and again make the call. The instant the release of the switches occurs, the fire-alarm box takes possession of the line and continues with the fire-alarm signals.

By the operation of the character wheel a trunk is established through the various selectors of the telephone exchange to a so-called repeater. Further operation brings the code wheel into action to send the impulses of current to actuate the repeater, which controls a trunk line from the automatic telephone exchange to fire headquarters. Four rounds of the alarm of fire go in. The line is then grounded; all contacts are opened, in order to clear the line and restore the telephone switch connections; and, lastly, the subscriber's telephone is restored to service. The entire operation is repeated twice, the second series of numbers being a confirmation of the first alarm.

After the alarm has been received at fire headquarters the attendant calls back on the telephone by ringnig the subscriber's bell to notify him that the alarm has been received.

With either an automatic or a manual telephone installation two alarms of fire may be handled simultaneously. For example, in the case of the manual telephone exchange, when a fire plug is connected it completes a circuit to fire headquarters and leaves all other plugs connected to a second alarm circuit which may be readily called into service if necessary.

It is interesting to note in this connection that the punching-register circuit to fire headquarters is under test continuously. As may be seen from Fig. 3, a break in this line will cause the bell *I* to ring and give notice of the disorder. Such precautions as this are highly desirable in a fire-alarm system, of course, as are also provisoins for giving immediate warning of breaks, grounds and similar troubles in the wiring.

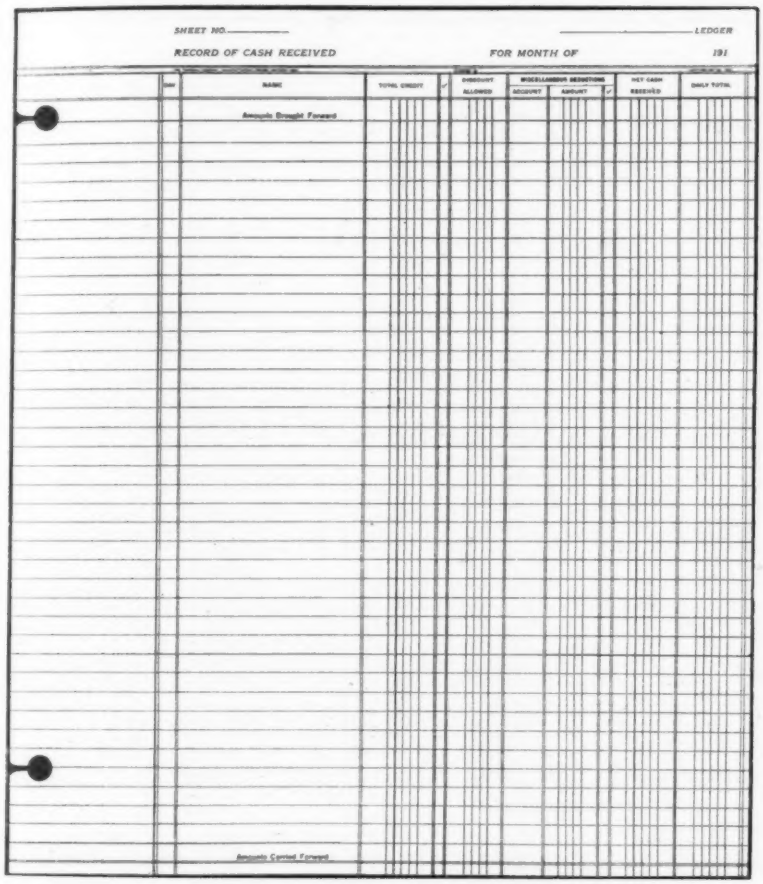
The occurrence of grounds on the

factory wiring is indicated by the telephone-trouble alarm and by the local trouble bell shown near the lower right-hand corner of Fig. 3. If a ground occurs at C_2 say, the circuit of a part of the gravity battery is completed through the ground. Current from this battery will then close the circuit of the telephone trouble alarm and the local trouble bell by means of the trouble relay.

Breaks in the line are indicated by the local trouble bell. There are suitable provisions for taking care of alarms of fire during the existence of troubles of the character just mentioned. Any adequate description of these, however, would require more space than is available here, even if it were essential to this article.

In some factory installations of the system in question fire-drill bells are installed on the various floors of the plant. These are operated by a device similar in construction to the fire-alarm box already described, with the difference that the code wheel is arranged to give four strokes of the bells, which is the code signal for fire. The release magnet of the movement which controls these bells and that in the fire-alarm transmitter are connected in series; so that the bells sound the alarm of fire throughout the building during the period the alarm is being received at fire headquarters.

The use of thermostats is also being considered in some cases. As designed for use on such a fire-alarm system as that described here, the thermostats are arranged in pairs. One thermostat operates at 120 degrees Fahrenheit and the other at 160. The first is intended to give a local alarm of fire and the other to send the alarm to headquarters.


SHEET NO. _____ _____ LEDGER

RECORD OF CASH RECEIVED FOR MONTH OF 191

	NAME	TOTAL CREDIT	✓	DISCOUNT ALLOWED	MISCELLANEOUS DEDUCTIONS ACCOUNT	MISCELLANEOUS DEDUCTIONS AMOUNT	✓	NET CASH RECEIVED	DAILY TOTAL
	Amounts Brought Forward								

cent of the total amount of the original contract. When the bill is made out, the charge should be entered in the ledger under the customer's name; he should be debited for the amount of the bill, and merchandise should be credited. The check received from the customer should be entered on the form shown in Fig. 7, under Cash Received. In fact, all cash received should be entered on this sheet; all money for each day should be totaled and entered to the Daily Total Column. This total should be banked and entered upon the form shown in Fig. 8.

All amounts received are entered on the Record of Cash Received (Fig. 7) and the total column Net Cash Received is entered in the ledger as a debit to cash. This, of course, is a simple form of double-entry bookkeeping; for in double-entry bookkeeping one must have a debit and a credit column for each transaction, and if an article is sold for cash, merchandise must be credited with what is taken from it and cash must be charged (or debited), with what is added to it.

It will be noted that the first column to the right of the name in Fig. 7 is intended for total credit. This is the amount received plus whatever deductions have been made, and recorded in the Discussion Allowed and the Miscellaneous Deductions columns. This amount should agree with the charge entered against the customer in the ledger according to invoice rendered and, therefore, the net amount received, and the deductions, should be credited to the account to balance the transaction.

To further explain the Discount Allowed and Miscellaneous Deduction columns, assume a discount of two per cent has been allowed in order to secure the payment of bills within ten days. This discount should be entered as a discount allowed and the net amount of the remittance extended to the Net Cash Received column.

Suppose again that the architect or the property owner makes a deduction from the contractor's bill for cartage, patching plaster, or for any other one of the large number of possible causes. If these deductions are allowed, they should also be recorded under Miscellaneous Deductions on the form shown in Fig. 7, and the net amount extended to the Net Cash Received Column. There are spaces here for both the number of the account and the amount of it. Every deduction should thus be taken care of.

The question of account numbers will be dealt with in a later paragraph.

The footing of the column for discounts allowed should be entered as a debit to the loss and gain, or, as it is sometimes called, the profit and loss account.

The reader will recall that the various items comprising this total were credited the different customer's accounts at the time the entries were made.

The deductions in the Miscellaneous Deduction column must be handled in the same way, except that instead of debiting gain and loss as was done before, it must be charged to whatever account it belongs. If it was for cartage, for instance, cartage instead of loss and gain is to be debited, and the person credited who deducted the cartage from the contractor's bill.

In the column for Net Cash Received, in Fig. 7, cash received is extended daily and entered in the column of daily totals. This daily total should be deposited in the bank, and entered in the column for deposits in Fig. 8.

The layout of the form shown in Fig. 9 is similar to that of the one shown in Fig. 7, there being a difference, however, in the headings of the columns. The third column, it will be noted, is for the number of the account. This number refers to the number of the account in the bills-payable distribution which will be explained subsequently. The general-ledger column need not be explained, for it is used very little.

Suppose that the contractor is ready to pay a bill; he enters in the form reproduced in Fig. 9, the name of the concern he is about to pay, the amount of the bill (this being put in the column of Accounts Payable), the cash discount if there is any (in the Purchase Discount column), the number of the check he is drawing, and the amount of the check. The amount of the check plus the discount must equal the amount in the column of accounts payable. The totals of all checks drawn for the day should be recorded in the columns of Daily Totals Credit Bank, totals being entered under date checks are drawn. In order to find the bank balance at any time it is only necessary to deduct the sum of the amounts of checks drawn from the sum of deposits made. The results of this subtraction should be put down in the column marked for Balance on Hand in Fig. 8. The columns for recording outstanding checks in Fig. 8 are made use of the first of each month when canceled checks are received from the bank. The canceled

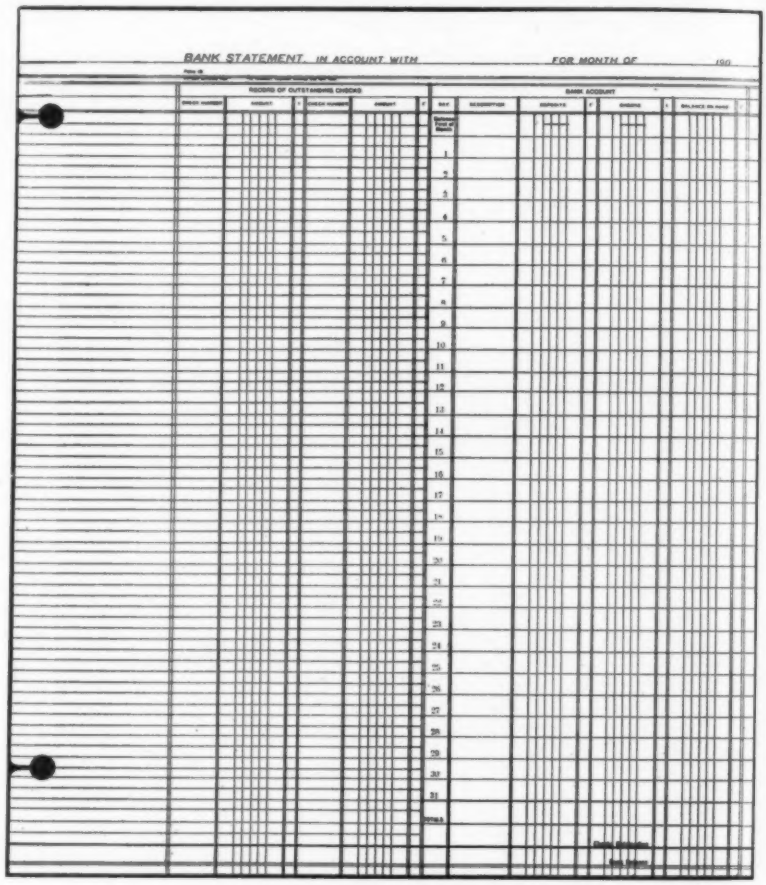


Fig. 8.—Bank Statement.

checks received should be examined to find what numbers are missing, and the missing numbers, with the amount of each check, should be recorded in these columns. The total of these is then taken and compared with the statement submitted by the bank. Thus the records of the bank are checked against those of the contractor.

Referring again to Fig. 9, it should be noted that the monthly total from the column arranged for recording purchase discounts should be entered as a credit to the loss and gain account in the ledger.

It is well to note here also that the best form of ledger for the system of accounting under consideration is one having the leaves arranged so that the contractor can make out his bill and make his ledger entry at the same time. This saves work and likewise gives him a duplicate of the bill for the ledger record.

At the end of the month the total amount of the column headed accounts payable, in Fig. 9, is entered in the ledger as a debit to accounts payable. The difference between debit and credit the contractor owes.

The writer appreciates the fact that some readers might get a better grasp of this accounting system by means of a practical illustration of the use of it. Hence in the next article, which will be the final one of the series, an account which was kept in doing a contract of electrical work will be included. It will be shown just how the actual amounts were handled on the different form sheets.

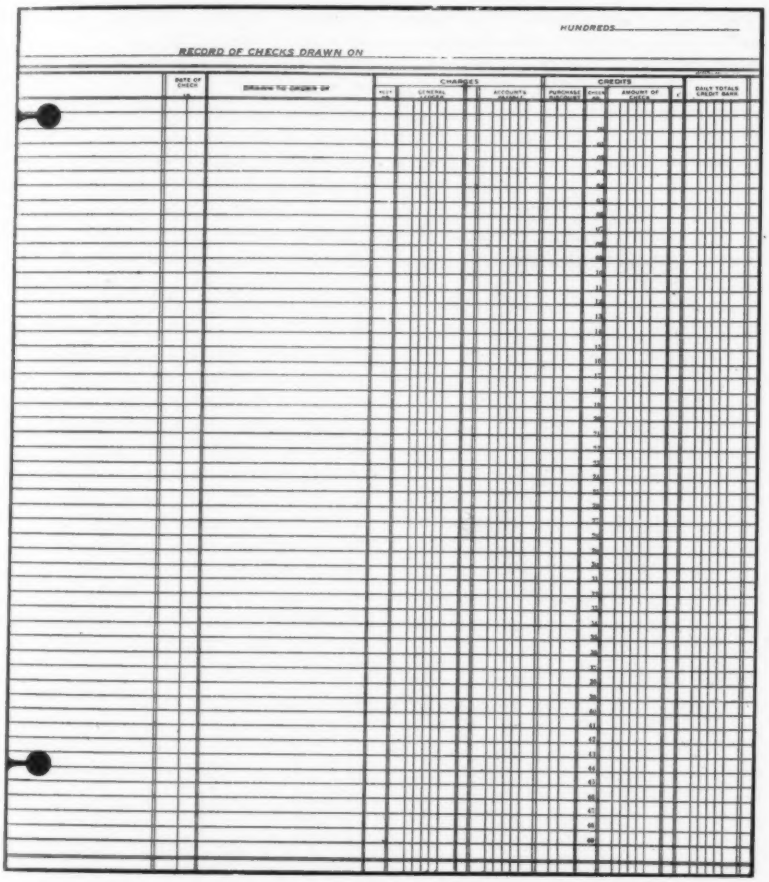


Fig. 9.—Form for Recording Checks Drawn by Contractor.

Meter Loops.

The commonwealth Edison Company, of Chicago, has just issued a circular letter to the electrical contractors of the city calling their attention to the fact that it is essential in the installation of meter loops in apartment buildings and office buildings where not more than three loops in a group are necessary that the service mains be piped or cleated, and carried along the meter board, the service mains and the pressure wires for the meters being brought out at the various points required. A neutral pressure tap is required on all direct-current meters, whether of the two-wire or the three-wire type, while for alternating-current meters a neutral pressure tap is only required for the two-wire type of instrument.

The letter calls attention to the necessity of special fuses for the protection of meters in apartment houses and office buildings wherever a group of more than six apartments or offices is dependent on the service switch or a branch block. Separate fuses must be provided on such installations between the service switch and the meter loops. On installations requiring 15 amperes or less, a plug-type fuse can be employed, and where the curent is greater than this open link fuses can be used.

On installations of one circuit the fuse installed to protect this circuit may also be utilized to protect the meter loops, but where there are two or more circuits a separate fuse independent of the circuit fuses is required.

The above requirements will be uniformly insisted upon by the company's inspectors, it is stated.

Among Contractors.

The Kokomo Electric Construction Company has been awarded a contract for the installation of a new lighting system in Garrett, Ind.

A contract for wiring the Advertising Building, in Chicago, for 600 incandescent lamps has been awarded the Pierce Electric Company, of that city.

The Board of Education has awarded a contract for electrical work in the Miller Street school, Newark, N. J., to McGowan & McCabe, 320 Market street, Newark, at a cost of $2.825.

A. L. Franks & Company, electrical contractors, of Manchester, N. H., are installing the electric wiring for 3,000 lights in the Androscogin Mills in Lewiston, Me.

The First Implement & Automobile Company, of Vinton, Ia., has added an electrical department to its business. The company will carry a complete line of electrical goods and will do electrical contracting.

Among the larger undertakings on which the Sanborn Electric Company, of Indianapolis, Ind., is now working is the complete wiring and electrical equipment of the new terminal railroad station and office building of the Detroit Tunnel Company, Detroit, Mich.; this building has about 800 offices and includes a large station. The new group of hospital buildings for the city of Louisville, Ky., is also being wired by this company. Among buildings being completely wired in Indianapolis are the new Washington Hotel and the Severin Hotel; these are thoroughly modern structures and

are being provided with the latest electrical equipment.

The Marine Electric Company, of Louisville, Ky., has been awarded a contract by the Wiggins Ferry Transfer Company, of St. Louis, Mo., for installing conduit wiring, switchboards and searchlights upon two large steel-hulled ferry-boats owned by the St. Louis company and operated by it in ferry traffic across the Mississippi River. The craft are at the wharf in Louisville.

The Francis Peabody interests, of Chicago, have let the contract for an electric power plant at Kincaid, Ill. The cost of installing this work is estimated to be $115,000.

E. F. Pendergast & Company, of Rockford, Ill., has just completed the installation of an electric lighting plant at Huntley, Ill. The contract included the erection of distribution lines over the town, the installation of a street-series lighting system, and the wiring of a number of houses. The lighting plant is owned by Victor May, of Huntley. The company mentioned has also lately completed the electrical work in the buildings of St. Vincent's Orphanage, at Freeport, Ill., and in a number of residences and business houses in Rockford.

The Beaver Engineering Company, Newark, N. J., has recently been awarded a contract amounting to $23,000 for the wiring of the State Hospital for Insane at Morris Plains, N. J. This installation consists of about 1,500 light outlets and 1,000 switch outlets in BX cable. A few of the other contracts this firm has are the new almshouse, Newark, N. J., and the public bathhouse, both of which are for engines, generators and wiring. The American National Bank Building, Child's Restaurant Building and the Roseville Masonic Temple have just been completed.

The Bland Electric Company, of Louisville, Ky., has contracted for the electrical work upon the new home of the Boston Shoe Company at Fourth Avenue and Green Street in that city. A handsome four-story building is now being erected by the H. H. Snyder Company upon the Harry Weissigner property and the Bland company will install conduit wiring, motor equipment, etc. The electrical work will cost about $2,500.

A. J. Anderson, president of A. J. Anderson & Company, one of the best known electrical contractors in Louisville, Ky; has been elected to membership in the Louisville Rotary Club. The honor is a signal one for Mr. Anderson, inasmuch as the Rotary Club is composed of but one representative of each line of business. He is, therefore, the only electrical contractor in the Louisville organization.

George R. Elder.

George R. Elder took up electrical work in 1901, when he was but 15 years of age. His first position was that of helper to an electrician working in the plant of the Morgan Pipe and Foundry Company, at Lynchburg, Va. Later on he was promoted to the position of chief electrician for this company, in which capacity he had charge of all interior wiring in its factories and also directed such repairs as have to be made in an industry of this kind using

George R. Elder.

electric motors and lights. Leaving this position, he became electrician for the Lynchburg Telephone Company. He continued in this place for some two years, and then entered the employ of the Hudson Electric Company, one of the larger electrical-contracting firms of Lynchburg. For four years he was foreman and superintendent of construction for the Hudson people.

Three years ago Mr. Elder decided to go into the electrical-contracting business for himself. He secured attractive and roomy quarters at 708 Main Street, Lynchburg, where a store carrying a general line of electrical supplies was opened and contractor's offices established. This location is one of the best in the city, and the store is kept attractive and modern.

Mr. Elder does a large contracting business in Lynchburg and throughout portions of Virginia and North Carolina. His company does various kinds of electrical construction, from the wiring of the smallest building to the installation of complete central stations.

Though one of the youngest men of any prominence in the contracting business, Mr. Elder is, as has been indicated already, a man with an enviable record of practical experience in his work. Moreover, he is a man who makes friends readily, and at whose success in business those who know him have no cause to be surprised.

An Electrical Contractor's Creed.

F. L. Decker, who does a prosperous contracting and electrical merchandising business in Chicago, distributes copies of a neatly designed card among his customers, containing the following summary of his business philosophy. It makes splendid reading.

"I believe in the goods I am selling, in the firm I am working for and in my ability to get results. I believe that honest goods can be sold to honest men by honest methods. I believe in working, not waiting, in laughing, not weeping, in boosting, not knocking, and in the pleasure of selling goods. I believe that a man gets what he goes after, that one order today is worth two orders tomorrow, and that no man is down and out until he has lost faith in himself. I believe in today and in the work I am doing, in tomorrow, and in the work I hope to do, and in the sure reward which the future holds. I believe in courtesy, in kindness, in generosity, in good cheer, in friendship, and honest competition. I believe there is an order somewhere, for every man ready to take one. I believe I am ready right now."

Two-Wire or Three-Wire Service?

The electrical contractor is sometimes annoyed when he undertakes a job of wiring because of the difficulty in making sure whether the building is to be supplied with a two-wire or with a three-wire service. In order to prevent there being any doubts in this matter on its lines in the future, the Commonwealth Edison Company, of Chicago, has issued a form letter to the contractors in the city stating that where there are not more than three circuits in the building, of 12 sockets each, two-wire services may be employed in residences and apartment houses. A residence where more than three circuits are installed must be wired for three-wire service connection and three-wire meter loops. In an apartment building where a total of over three circuits is installed the service connection must be three-wire, but the meter loops should be two-wire, provided there are not over three circuits per apartment.

These rules do not apply to wiring for business lighting. Here any installation of more than two circuits must have three-wire service mains and three-wire meter loops.

Public Service Commissions

CALIFORNIA.

Permission was granted to the Great Western Power Company to purchase the North Sacramento Light & Water Company for $9,000 and to assume obligations.

A decision has been rendered granting permission to the Burbank Electric Light & Power Company to exercise franchise rights for the sale of electricity in Burbank, and also to issue 20,000 shares of stock to be sold at $10 per share to finance the construction.

A decision was rendered granting the Pacific Electric Railway Company permission to issue $5,285,000 of bonds. The bonds are to be used to retire underlying securities of the Los Angeles Interurban Railway Company in the amount of $2,537,000; the Los Angeles & Redondo Railway Company in the amount of $500,000; and the Los Angeles & Rendondo Railway Company in the amount of $2,248,000.

The Southern Pacific Railroad was granted permission to purchase the franchises in the city of Richmond of John H. Nicholl and H. C. Cutting. These franchises will be used in the interurban system to connect Richmond with the cities of Berkeley, Oakland and Alameda.

A decision was rendered, upon complaint of the Chamber of Commerce of San Leandro, granting to the entire city of San Leandro the superior telephone service and lower rates given by the Pacific Telephone & Telegraph Company to a certain portion of the city known as Broadmoor Tract.

The Commission has begun plans for the valuation of the electric railroads of the state. The valuation of steam railroads has been in progress for several months. An order was issued calling upon the electric railroads of the state to furnish necessary inventories and statements to enable the Commission to proceed with the appraisement of their properties.

A decision has been rendered providing for a reduction in the wholesale rate on electric power sold by the Snow Mountain Water & Power Company to the Napa Valley Electric Company. The order puts into effect a reduction from an average of 1.81 cents per kilowatt-hour to a rate varying from 1 cent to 1.25 cents per kilowatt-hour, and the Commission states that it expects the Napa Valley Electric Company to reflect this decrease in lower rates to its consumers.

Decision was rendered in the case of the City of Pasadena vs. the Southern California Edison Company, in which the former had complained that the latter had reduced its rate in Pasadena to a point which made impossible the profitable operation of the municipal lighting plant of Pasadena. The City of Pasadena charged discrimination and asked that the Southern California Edison Company be compelled to raise its rate in Pasadena. The Commission sustains the objection raised by the Southern California Edison Company, that the city of Pasadena itself has the power to fix rates within its limits, and such power does not rest with the Railroad Commission. The Commission suggests that the issue may be presented by a complaint from the unincorporated territory charging discrimination.

A decision was rendered granting permission to the San Jose Terminal Railway Company to issue $400,000 of bonds, to be used for the construction of an electric railway between San Jose and Alviso, and for the establishment of a boat service between Alviso and San Francisco.

The Commission is preparing a uniform system of accounts and classifications for gas companies and for electric companies, which will be printed as soon as possible and distributed to interested parties.

NEW JERSEY.

The petition filed by the city authorities of Newark, N. J., with the State Board of Public Utility Commissioners, requesting that the Public Service Electric Company furnish the city's 98 municipal buildings with electric energy on a sliding scale, according to amount consumed (instead of 10 cents per kilowatt-hour, as now) has been denied. The Board holds that no distinction should be made between the city and private consumers.

OKLAHOMA.

Following the decision of the Oklahoma Supreme Court that the raise in rates made by the Pioneer Telephone Company in Oklahoma City in 1909, with the consent of the city council but without authority from the Corporation Commission, was illegal, James S. Twyford, who was city attorney of Oklahoma City at the time of the raise and fought it in the courts, has commenced proceedings before the Corporation Commission to require the Pioneer to return to subscribers the amounts collected since June 1, 1909, in excess of the rates in force at that time, which would amount altogether to approximately $60,000.

NEW YORK.

The Public Service Commission, First District, has been holding hearings on the application of the New York Railways Company to be made a party in the transfer proceeding, and to put into operation in Manhattan a transfer system by which transfer privileges will be given passengers from the north and south surface car lines to the Fifty-ninth Street crosstown line. More than a year ago the Commission ordered the receivers of the Metropolitan Street Railway Company to establish transfer privileges at 151 points where the Manhattan surface roads intersect. The receivers refused to obey the order and took the matter into court on a writ of certiorari. Since that time the New York Railways Company has succeeded to the ownership and control of the Metropolitan Street Railway property, and now proposes to end the litigation by establishing a system of transfers which the company believes will satisfy the demands of the public.

The Commission has granted the New York Railways Company permission to issue bonds to the extent of $640,000, the proceeds of which are to be applied to the purchase of 175 of the new stepless cars, for use on the principal surface lines of the company's system. It is estimated that these cars will cost $6,000 each, and the company had applied for a bond issue of $1,050,000 to cover the whole cost. It was the plan to retire 175 of the cars now in use when the new cars were placed in service. The Commission, acting on an opinion by Commissioner Milo R. Maltbie, refused to allow the company to capitalize this replacement in its entirety, as both the law and the orders of the Commission forbid the issue of bonds for replacements, which should be paid for out of earnings. Inasmuch, however, as the old cars had cost the company about $3,200 each and the

new cars were to cost $2,800 in excess of that, the Commission allowed the company to capitalize the difference between the old cost and the new. Allowing for the sale value of the old cars at about $800 each, the total amount permissable for capitalization was about $500,000. The Commission accordingly allowed a bond issue sufficient to produce this amount in cash. As the bonds are to be issued under the first real-estate and refunding mortgage and will bear four per cent interest, the Commission orders that they shall be sold at not less than 78, and for the discount and expense of sale allow a margin of $140,800, making the total issue $640,000. The order also provides for the amortization of this $140,800 by the annual payment into a sinking fund of $2,700.

The company, in the same application, asked for a bond issue of $550,000 to pay for additions to be made to its car barn at Fifty-fourth Street and Ninth Avenue. As the company is contemplating the sale of another car barn at Thirty-Second Street and Lexington Avenue, and the proposed additions to the Fifty-fourth Street barn are in the nature of replacement for the Thirty-second Street barn, the Commission, applying the same principles as it did in the case of the cars, refused to allow the capitalization of this expenditure, and pointed out that if the sale of the Thirty-second Street barn is effected the company will derive sufficient funds from that source to more than pay for the contemplated improvement in the Fifty-fourth Street barn.

The Commission has received the report of its accident bureau showing the number of accidents which occurred on the railroads and street railroads in Greater New York for the month of September, 1912. The total number killed was 24 as against 37 in the same month last year. The total number of serious injuries was 202 as against 233 for September, 1911. The total number of accidents of all kinds was 5,901 as against 5,720 for September, 1911.

The application of the Brooklyn Rapid Transit interests for permission to merge and consolidate the capital stock, franchises and property of the Brooklyn Union Elevated Railroad Company, the Sea Beach Railway Company and the Canarsie Railroad Company has been granted by the Public Service Commission. The new company will be known as the New York Consolidated Railroad Company, and will have a capital stock equal to the aggregate amount of the capital stock of all the merged companies, namely, $18,900,000.

The Public Service Commission, Second District, has authorized the Northwestern Telephone & Telegraph Company, which operates in and about Carthage, N. Y., to issue its 20-year gold coupon bonds bearing interest at the rate of five per cent per annum, to the par value of $11,000, bonds to be sold at not less than 95, and the proceeds to be used for a new switchboard, new cables, new toll circuit between Carthage and Black River, new toll circuit from Benson Mines to Harrisville, and for refunding obligations of the company incurred for capital purposes.

The Commission has authorized the LeRoy Hydraulic, Electric and Gas Company to exercise a franchise for the furnishing of electricity in the town of LeRoy, Genesee County.

The Commission has dismissed the application of the Central & South American Telegraph Company, for leave to issue $2,100,000 additional capital stock. The company desires authority to issue this stock for moneys expended out of the net income of the corporation during the past five years. The Commission gives as its reason for dismissing the application, that under the provisions of the Public Service Commission's law relating to telegraph corporations, it is called upon to pass only upon expenditures of New York State corporations within the state of New York, and in this case all of the expenditures are without the state, and the consent of the Commission is unnecessary.

The Commission has received complaints that in certain instances prepayment has been made for delivery of telegrams when in fact the messages were delivered by telephone without charge. Following an investigation of the Division of Telegraphs & Telephones the Western Union Telegraph Company is issuing instructions that in every case in which the message is telephoned to the addressee without expense for the telephone service, and where the addressee expresses himself as being satisfied with the telephone delivery and as not desiring the delivery of a written copy of the message by messenger, the office of destination shall notify the office of origin by mail of the facts and request the originating office to refund the delivery charge to the sender. The originating office will thereupon make such refund to the sender.

Among the Supply Men

The Electrical Supply Jobbers' Convention.

The convention of the Electrical Supply Jobbers' Association will be held at Hot Springs, Va., November 13, 14 and 15. Headquarters will be established at the Homestead Hotel. A special train will leave Chicago over the Big Four Railroad, Twelfth Street and Michigan Avenue, Tuesday, November 12, at 1:00 p. m. It is expected that there will be a record-breaking attendance and everyone is assured a good time. The entertainment features are all arranged for, and the field events will be particularly attractive, a number of handsome prizes having been arranged for the jobbers and manufacturers.

Maynard, Sturtevant & Company, successors to R. J. Maynard, Jr., & Company, have moved to 114 Arcade Building, 365 Cordova Street, West, Vancouver, B. C. R. J. Maynard, Jr., writes that in slightly less than a year's time the organization has made progress far in excess of its expectations in the wholesaling and retailing of electrical supplies and apparatus. The company calls on the trade of the Province of British Columbia, and is desirous of getting in touch with manufacturers of supplies for electrical contractors and dealers.

The James Clark, Jr., Electric Company, Louisville, Ky., is planning to build two iron-clad warehouses at 633 Bergmann Avenue. The warehouses will be used for general storage purposes at the electrical equipment factory of the Clark company, which has come to be one of the biggest and best known establishments in the South.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 102.—Fenders for Automobiles.—The City Council is considering an ordinance requiring all automobiles, electric as well as gasoline or steam, to have fenders. While it is true that fenders on street cars running over a smooth track have been instrumental in saving life, I believe that it is not at all feasible to use a fender on an automobile which must run over rough pavements, through ruts and over other obstructions that would very quickly crush a fender and possibly cause a serious accident to the automobile and its occupants. Has an effective automobile fender ever been developed? Are they required in any American city?—M. C., Chicago, Ill.

No. 103.—Insulation Test of Transformers.—(1) Is the test for insulation resistance between the windings of a transformer by the voltmeter method considered reliable? (2) What should the insulation resistance be in ohms between the windings of the various sizes of transformers from 5 up to 250 kilowatts? (3) What method is used in testing the insulation at the factory?—J. G. M., Galveston, Tex.

No. 104.—Choice of Tungsten Lamps to Suit Circuit Voltage.—What rational excuse is there for a central-station company selling nothing but 114-volt tungsten lamps to its customers when the prevailing voltage of its lines is 110 volts and the customers ask for 110-volt lamps?—D. S. C., Oak Park, Ill.

No. 105.—Accuracy of Instrument Transformers.—Is the multiplying power of current and potential transformers used with alternating-current measuring instruments always independent of wave-form and frequency? Does it depend on the amount of load or the number of instruments connected to the secondary, or to the power-factor of the circuit?—W. I. R., Atlanta, Ga.

No. 106—Progress Payments for Knob-and-Tube Work.—In conduit wiring it is customary among contractors to receive 60 per cent of the contract price on completing the roughing-in work, this comprising the installation of all the conduit, outlet boxes and so forth. What is the practice in this regard on large knob-and-tube jobs, in which the roughing work includes a much larger percentage of the material and labor to be supplied? Is 60 per cent or a larger part of the total cost demanded?—W. T. K., St. Paul, Minn.

No. 107.—Wiring Reinforced-Concrete Buildings.—Is it practical to use concealed conduit in a reinforced-concrete building in which even the floors are of monolithic concrete? If so, how is the conduit installed?—H. S. M., South Bend, Ind.

Answers.

No. 97.—Alternating-Current Water Heater.—Is it practical to build an electric water heater using alternating current passing right through the water and heating it by overcoming its resistance? Would this not have a higher efficiency than one with the ordinary heating element placed below the tank or imbedded in the bottom? What would have to be the spacing of the electrodes and what current would be required at 110 volts, 60 cycles, to raise the temperature of 50 gallons of water about 100 degrees Fahrenheit in half an hour?—B. N. F., Ames, Iowa.

Water can be heated by electricity by passing the current right through the water a little cheaper than is possible with externally applied heating elements. It is dangerous, however, unless the receptacle be of metal and thoroughly grounded. To heat 50 gallons 100 degrees in 30 minutes requires about 245 amperes at 110 volts and 60 cycles. This may vary owing to the difference in purity in waters of different localities. The plates of the heating elements can be spaced from three-eighths to one-half inch apart and will require a surface of about 14,000 square inches. A heating unit of such large area can be made by building up disks as shown in the accompanying sketch. The holes in the disk are for the better circulation of the water. A similar arrangement could be used with the plates vertical, like those in a storage battery; in this case it would not be necessary to perforate them.—C. E. H., Unionville, Conn.

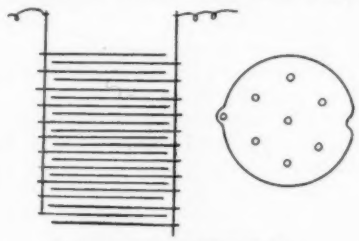


Diagram of Heating Unit.

The method mentioned is not practical, for the reason that heaters are designed to heat liquids from a constant-potential circuit without the necessity of having an indicating instrument and a regulating resistance to limit the current flowing with the change in resistance of the various liquids. It is seen at once that, if a heater were designed for water of a given resistance and anything were added to reduce the resistance or if very impure water were used, the current flow would greatly increase, possibly to such an extent as to operate the fuse or other protective device in the circuit. Even with alternating current some electrolysis would be possible with the current flowing through the liquid. Whether it would have a higher efficiency or not would depend on what steps were taken to retain the heat developed in the heater. In the case given the spacing of the electrodes would depend upon the shape and size of the vessel and electrodes, and also the resistance of the liquid and the allowable motion of the water due to the boiling action of the current in passing through it. To raise the temperature of one pound of water one degree Fahrenheit requires 1,055 joules. As 50 gallons of water weigh $50 \times 8.34 = 417$ pounds, it requires $417 \times 1{,}055 \times 100 = 43{,}992{,}500$ joules to raise the temperature of 50 gallons of water 100 degrees Fahrenheit. Since 1 joule = 1 watt-second and 3,600 watt-seconds = 1 watt-hour, $43{,}992{,}500/3{,}600 = 12{,}220$ watt-hours will be required, provided there were no loss of heat. The power required varies inversely as the time, and since the water is to be raised 100 degrees in one-half hour it will be necessary to expend $2 \times 12{,}220 = 24{,}440$ watts, which at 110 volts will make a current of 222 amperes. As the efficiency would probably be near 60 per cent the actual current necessary would be near 370 amperes.—H. E. W., Chicago.

No. 98.—Loose Bars in Squirrel-Cage Rotor.—In the Electrical Review and Western Electrician for August 31 the article by F. McNeill says, speaking of loose rotor bars, that the only remedy is to take the rotor entirely apart, clean the ends thoroughly and tin them, and when reassembling solder between the bars and rings when tightening the screws. This is best done with a gasoline torch. I have a Fairbanks-Morse 20-horsepower motor, which has been grossly abused by being forced to carry nearly three times its rated load, and in which about one-half the bars are loose at one end, and the screws are loose also. On trying to get the rest of the screws out I find that I am unable to heat them sufficiently to loosen them, even though I use a good torch. The metal of the rotor conducts the heat away too rapidly. What is the usual way of making repairs of this kind outside of a factory where all the conveniences are not at hand.—C. W. G., Muskegon, Mich.

I frequently have to solder rotor bars to end rings and have had occasion to do this for all sizes of motors from 2 to 300 horsepower. I find the following method facilitates the soldering to a very great extent. I thoroughly clean the ends of the bars and

end rings and tin them; then I place them in position and make a paste of asbestos fiber and put it between the bars and over them, leaving just the contact between the end ring and rotor bar exposed. Then I apply the soldering flux and heat the contacts with an ordinary blow torch, the asbestos keeping the heat from radiating along the bar. The asbestos fiber I have reference to, we buy in bags for making plastic packing for our engine, but in case none should be available, you can dissolve ordinary asbestos board in water and it will answer the purpose just as well.—W. W. B., Salisbury Center, N. Y.

No. 99.—Reflectors for Railroad-Platform Lamps.—I have frequently noticed that the reflectors used over the lamps on station platforms are generally in bad condition both from corrosion and lack of cleaning. What type of reflector is best capable of giving reasonable efficiency and long life under these adverse conditions? Would repainting the inside of the ordinary tin reflector twice a year with good white paint answer the purpose as well as an enameled or glazed reflector? Does white enamel withstand the action of sulphurous locomotive smoke?—B. N. P., Evansville, Ind.

Enameled or tin reflectors are always subject to corrosion, and when in use for a while their surface becomes roughened, making it easier for dirt to adhere, and harder to clean as time goes on. My experience in these matters leads me to favor opal glass reflectors for this and similar work. While enameled-steel reflectors can withstand harder knocks, in practice the lamp and reflectors are generally located well out of harm's way, and as glass reflectors are now made very tough, they are but rarely broken. A good opal reflector costs at the most, not more than an enameled one, and is at least as efficient as the polished surface of opal glass is permanent, it is always easy to clean, merely by wiping with a piece of waste, without taking the reflector down. Taken all in all, glass requires the least care and even when neglected entirely, gives rather the best service.—H. P., New York, N. Y.

No. 100.—Electric Welding.—What is the best method for electrically welding small articles with a butt joint less than one square inch in section? Is an arc used in spot welding of long seams?—F. D. A., South Omaha, Neb.

The inquirer has not given sufficient data to permit a full reply. In case that he has a quantity of one size and shape of wrought iron or steel (not cast) parts the butt welder is by all means the best as giving the greater strength of joint with a minimum cost for labor and power. The same applies to copper. The power required for steel or iron parts of one square inch area will be 25 kilowatts for 25 seconds per joint. In case that cast iron, brass or other alloys are used, or the number of parts to be joined is small, it is possible that the arc welder will do the work at less expense. This is a system requiring, however, much greater skill in place of the equipment required by the butt-welding method. Power required would be from 10 to 15 kilowatts for two to three minutes at the outside.—W. M. P., Seattle, Wash.

LETTER TO THE EDITOR.

National Code and City Rules.

To the Editor:

I have read with interest the answers printed in reply to question No. 96 on page 794 of your issue of October 26 in the department of Questions and Answers, as well as the accompanying editorial, and still feel that there is quite a little more that may be said.

(1) As to what may exist in other parts of the country I do not know, but in my own section I know that there is not the slightest attempt or desire on the part of any municipality to prevent other than local men from doing work therein, neither have I found by investigation it to be common elsewhere.

(2) A very large part of the difficulty frequently arises from a man desiring to bid on a job not taking the trouble to find out beforehand if there are special requirements to be met; then quite possibly for this very reason his figure is low, is accepted and of course the result is financial loss. Only recently this thing occurred in my own case, a contractor from the metropolis coming into my little territory and claiming he had never heard of any municipal regulations, yet not six weeks before that very time I had been invited to speak to the association of which he was a member on Municipal Inspection and the Code, had had my name borne on the notice, had made the address and had as it happened cited the identical local rule he objected to and its purpose.

(3) Our friend should remember that while the insurance inspector is subject only to his company and to the policy holder, the municipal inspector represents the municipality and each member of the same; he must through his rules seek to protect each citizen against not only the results of others' acts, but of his own ignorance as well; he must also be in a condition to protect the municipality as well against suits for damages brought by parties coming to grief while using inspected and approved apparatus, and be prepared to back up his requirements on the witness stand with facts, reasons, etc., if necessary, to the limit, and a wise inspection department will always bear that in mind.

(4) Another thing to be borne in mind is that the municipal inspector must always consider life and accident (other than consequent upon fire) risks which fundamentally the fire-insurance men under their policies can not. This with other things makes it practically ludicrous to say, as does E. C. B., Kansas City: "As soon as the National Electrical Code becomes more generally known and work more standardized in accordance with it, the city regulations will keep in touch with the advance." The municipal regulations so far as I know are almost invariably more stringent and in advance for the reasons given above. Again it is ridiculous to say that a code intended to cover the whole country could ever demand all the things absolutely needed in such a huge lake-shore city as Chicago, a seacoast metropolis like New York sitting on a rock, or a city like Boston on a group of drumlins and made land on a flat coastal plain.

In my own case, my territory lies along a sluggish river winding through low meadows less than ten feet below the level of the streets of the town in many places, and from these meadows in spring and autumn with the chill nights and warm days we get damp fogs rising, the air being loaded with river vapor and some acid, as we are near enough to the sea for the normal chlorine in the soil to be quite high. Now in those parts of the town close to the river it is really essential that every soldered joint be painted with preservative paint, otherwise at these seasons with the varying temperature of the houses and circuits themselves this dampness will get to the joint and in time do serious harm. I tried this out with a set of thirty joints made up in various ways and variously exposed for a couple of years before I adopted the rule in question. This was the controversial point referred to earlier.

I quite agree that all unnecessary variation between the several municipal requirements in the same section should be avoided so far as possible, which can best be brought about through an association, as, for instance, that of the Massachusetts Municipal Electrical Inspectors; but after all is done we must still rely on the individual contractor being thoughtful enough before starting in on a job or committing himself to a contract, to inform himself as to what local requirements may be in force.

W. Lincoln Smith.

Concord, Mass., October 28, 1912.

INDIANA ELECTRIC LIGHT ASSOCIATION.

Fourth Annual Convention, Indianapolis, Ind., October 30-31.

The fourth annual convention of the Indiana Electric Light Association was held at the Claypool Hotel, Indianapolis, on Wednesday and Thursday of last week. From the standpoint of attendance and interest taken in the proceedings the convention was the best that the Association has yet held. The total attendance was over 160, of whom about three-fifths were central-station representatives. The program was short, largely because of the failure to materialize of several papers and speakers that had been announced. Despite this the keenest attention was given to each paper and topic presented and there was a free interchange of ideas both during and between the sessions. A new feature of this year's convention was the attendance of a small group of ladies, whose presence was particularly appreciated during the banquet.

The first session of the convention was called at 11 o'clock on Wednesday morning by President F. A. Bryan, of South Bend. After the approval of the minutes of the last meeting Mr. Bryan read his annual presidential address.

President's Address.

Although the Association is only four years old, it has made steady progress both in membership and influence. Mr. Bryan called attention to the objects of its organization and to the advantages to be derived from membership and attendance at conventions. The extraordinary development of the central-station business is largely due to the advance in technical and commercial methods that has resulted from their free discussion in conventions. The greatest need of the industry now seems to be the need of educating the public to the aims and difficulties of the business. Failure to understand these accounts chiefly for the ill-will shown to public-utility corporations in many quarters. Errors have been made in the past, but now utility managers are almost universally trying to be square; in fact, they regard themselves as quasi-public officials. The public must be taught the importance and effect of depreciation, obsolescence, special investment for peak loads and reserve equipment, risks of the business and other factors that influence the character of the service or the rates that must be charged therefor. Even employees should be taught these things, so that they may have an intelligent knowledge of what the central station is doing and trying to do. Mr. Bryan urged that members of the Association and their employees join the National Electric Light Association. He concluded with a reference to the probability of legislation creating a public service commission in Indiana. If such legislation is fair to all interests, everyone will be in favor of it. He hoped that a fair law would be passed and that, if a commission is created, it be composed of capable men.

The annual report of Secretary-Treasurer Z. V. Zartman, of Indianapolis, showed a gain of 12 active company members, making the net active membership 73. The financial condition of the Association is excellent; by securing advertisements in the year book of the Association the expense of its publication has been more than met.

Central-Station Heating.

At the afternoon session, which began at 2:20, the program of papers was opened with the presentation of one on "Central-Station Heating," by A. G. Rogers, Toledo, O. He admitted he was an enthusiast on this utility, because when installed and operated in accordance with discretion and good judgment it yields most excellent results. The advisability of using exhaust steam from a central station for heating depends upon many conditions, such as the price of coal, the reliability of its delivery, character of district to be served, etc. There are two classes of district heating, one employing steam and the other hot water. Each of these classes is again subdivided into two, depending upon whether a single or double pipe system is used. The choice of the system depends chiefly upon local conditions. The business district usually is best served by means of a steam system, as this economizes on the size of the underground piping and also on the size of the radiators in each room; the demand for heat during the night is very small and in the morning the buildings can be very rapidly heated up to the right temperature. Residence districts, however, usually are better adapted to the hot-water system, because the requirements are for a steady heat both day and night for some seven or eight months. It is not difficult to secure heating business because practically every community is eager to utilize the district heating plan. In fact, the demand is nearly always in excess of the steam supply available. Mr. Rogers believes that in the future it will not be uncommon to have the owners of a group of residences club together to get one local heating system for a dozen or so buildings so that they may dispense with their individual furnaces; this will no doubt result in great convenience and material saving to all concerned and will be the means of supplying district heating to those that are eager for it but are not favorably located to central stations. The exhaust from a central station contains something like 60 per cent of the original heat energy of the coal, and it seems highly desirable that this should be utilized. Where the conditions for district heating are favorable, this heat in the exhaust can be utilized with material profit to the station owners. However, it must be realized that this business is not all "velvet." If the system is well installed and properly operated and maintained, it can be made to pay not only for itself but to bring added returns by getting satisfied and more numerous customers for electrical energy.

H. A. Woodworth, Indianapolis, also presented a paper on the subject, in which he discussed chiefly the reasons for the failure of many old plants. Probably the chief one of these was the use of a flat-rate basis of charging. This resulted in nearly all cases in great waste of heat on the part of the customer and in poor maintenance of his house-heating equipment. Moreover, the flat rates were usually established on the wrong basis and failed to take care of special conditions. The meter system, on the contrary, causes the consumer to maintain an efficient equipment in his house and causes him to be reasonably economical of the heat supply. Several tests have shown that flat-rate consumers use about 55 per cent more steam than those having meter service. An equitable rate in many cases is found to be 50 cents per 1,000 pounds of steam. Another very great source of former failure was inefficient and poor construction of the underground piping. A low first cost of the underground equipment usually defeats itself in the end. Four very important requirements pointed out by Mr. Woodworth in order to get a satisfactory and profitable heating system are: efficient and long-lived underground piping system, use of meters for all customers, efficient house installations, periodic and close inspection.

B. T. Gifford, of the American District Steam Company, opened the discussion by a consideration of the matter of balancing the electric and heating load. The heating load should not be allowed to exceed the exhaust steam made available by the electric load unless a syndicate system or group of plants is operated together. Since the demand for heat is usually in excess of its supply it is not advisable to take on heating customers indiscriminately, but rather to pick out what will be the cream of the business. It is extremely important to have a well constructed and thoroughly insulated underground piping system in order to keep the line condensation to a minimum. The bleeder type of turbine has been found

very successful in those cases where the relative demands for electric power and for heat are variable. Since no meter has been developed that can be used on hot-water systems to show the quantity of heating that has been supplied, it follows that hot-water systems must always be on a flat-rate basis. If all considerations are carefully weighed a flat-rate system of charging can be equitably used. A meter system, however, is always preferable. Most companies employ a straight meter rate, but the readiness-to-serve system of charging has been very satisfactorily applied in some cases.

T. C. McReynolds, Kokomo, said that in determining whether to install a heating auxiliary to a station, proper account must be taken of the commercial as well as engineering features. The heating business is an easy one to obtain, because heating supply is a desirable utility. In many cases it will be desirable to put in the heating system even though the preliminary results may seem to be doubtful, because the supply of heat is usually an excellent preventative of competition. If the company has a modern and highly efficient plant, the heating auxiliary is not so desirable. The question of profit or loss depends frequently upon a good balancing of the heating and electric loads.

Thomas Donohue, Lafayette, called attention to the investigation conducted by one of the committees of the National Electric Light Association, which had made inquiries among a very large number of plants making use of exhaust-steam heating, the owners of a great majority of which consider it very profitable, particularly in view of the added prestige it gives to the company.

N. M. Argabrite, Elwood, speaking of balancing the load, said that if the load-factor of the electric system is poor, it is highly desirable to build up more electric load, so that more steam will be available for the heating system. He described a syndicate system having three plants, with one of which there was connected a hot-water system; this, however, had more heating load than could be supplied from the exhaust; therefore about four months each winter additional steam had to be developed in order to get sufficient temperature in the heating system. When this plant was taken over by the syndicate, two other adjoining ones were connected to it electrically, and when the increased demand for heating came on more electric load was thrown on the plant, so that no live steam had to be generated for the heating system. Discussing the matter of meter and flat-rate charging, he considered the latter system to be satisfactory if proper consideration is taken of all matters that affect the rates to be charged. He cited one plant in which the heating system was installed as an auxiliary in order to prevent the installation of isolated plants in two large buildings. This is often a very important consideration because, if the company can supply both heat, light and power, there is no necessity whatever for installing isolated plants. In many combination electric and heating plants the entire coal bills are met by the revenue from the heating plant alone.

C. E. Layton, Lebanon, advised taking very close account of the depreciation of the heating system. In many cases it has been found that the average life of hot-water mains is only about ten years. Therefore it is desirable to put in an underground system that will involve perhaps larger investment but will be more economical in in the end. It is also desirable to try to secure a very concentrated heating load so as to have minimum length of piping in a district, and therefore minimum investment, depreciation and line losses.

Mr. McReynolds added to his preceeding remarks that however desirable the heating business is, no manager should get the impression that it will be a gold mine in the first, second or even third years after its installation. If the load-factor and installation are satisfactory then the heating business should be also. Mr. Gifford alluded to the losses caused by leaky mains. He had found many instances in which mains last much over ten years, and there is no reason why, if they are properly installed, they should not do so. The entire underground line must be absolutely tight and should be well underdrained. President Bryan, in closing the discussion, called attention to the fact that some years ago the losses existing in electric lines were a continal source of discussion. Nowadays, however, methods have been so improved that they are no longer formidable. It is interesting to note that the matter of losses in heating systems is now being discussed, and very likely in a few years construction will have been so standardized that the losses will have been rendered very small.

Public Service Commissions.

An address on the subject of "Public Service Commissions" was made by D. L. Gaskill, secretary of the Ohio Electric Light Association. Speaking of the probability of the enactment of a law on this subject in Indiana, Mr. Gaskill called the attention of the central-station men present that commission rule is quite the style these days and that when equitably carried out is a great boon to the utility industries. In drafting the proposed law, it should be insisted upon that all the provisions which it covers be fair and equitable to the utility companies as well as to the public and that the commission created be likewise. Hitherto the attitude of the public toward public utility companies has not been the best. However, this has largely been due to mistakes on the part of many companies. Proper publicity campaigns should have been begun many years ago. Any public service commission must stand as a bulwark between the utility companies and the public. It must be composed of the very best men and those that understand the problems confronting utilities should by no means be debarred; the commissioners should have ample compensation because, if their work is properly done, it will be an arduous undertaking for them. Every feature of the law must be broad-gauged. The insistence on nondiscriminatory rates that are usually required under commission control is really a blessing. The various types of service must be classified and fixed printed schedules covering their rates should be prepared and backed up by the commission. This feature has been found a very excellent one to controvert those people who wish special favors done. In fixing the rates all fixed charges must be taken into consideration as well as operating costs. The law should permit an appeal from the commission to the courts, even though this will seldom or never be resorted to. A uniform and thorough system of accounting should be provided for. This also is a very desirable feature for all utility companies. Among other things the law should provide (1) for the control of rates and service; (2) the debarring of franchises to competitors unless the service conditions demand this and consent is obtained from the commission; (3) the commission should have control of municipal as well as of corporation or private plants both as to rates and quality of service, and insistence should be placed upon having these rates not below actual cost of service. The commission should be given power to control the capitalization of public utility companies. This feature alone puts utility finances on a sound basis. In closing, Mr. Gaskill reiterated his conviction that fair and equitable commission control is a blessing to the utility companies as well as to the public. He advised the Indiana authorities that they could do no better in the drafting of their law than copy the Wisconsin act.

C. C. Perry, Indianapolis, said that misrepresentations so commonly made about public service utilities are due to a lack of understanding between the companies and the public. In regard to the proposed legislation he

felt that an exact copy of the Wisconsin law is impossible in Indiana because indeterminate franchises are prohibited by the Indiana state constitution. A properly drafted law well administered will doubtless prove desirable to the utilities. Such a law should and no doubt will do away with discrimination. Overcapitalization has been the bane of American utilities. He heartily indorsed Mr. Gaskill's suggestions.

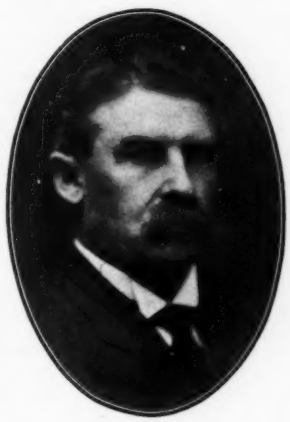
E. J. Condon, Argola, described the operation of the Wisconsin utility law, particularly that feature dealing with indeterminate franchises. The courts have generally affirmed the decisions of the Wisconsin Commission, even against the clamor of some municipalities. Wisconsin has been very fortunate in having had very able commissioners. He referred to the Massachusetts public utility law, which has been in force some 27 years and is, in Mr. Condon's opinion, the best law in the country on the subject. He referred to a case in Massachusetts in which the commission insisted upon a raising of the rates of a competing municipal plant, because it had been found that these did not make adequate provision for fixed charges, depreciation and maintenance.

T. C. Reynolds, Kokomo, said that in the proposed enactment the utility interests should take an unselfish attitude, because it must be plain to them that the law must protect the public as well as the utility. He felt that it was very much better to have fair state commission regulation than the continual petty and vexatious municipal interferences.

Central-Station Accounting.

On Thursday morning the session was opened by the presentation of a paper on "Central-Station Accounting," prepared by E. J. Cady, of the Baker-Vawter Company, Chicago. In the absence of the author this paper was read by Secretary Zartman. The adoption of a standard system of accounting is strongly advocated by the author. The paper is devoted chiefly to a description of a very simple and effective system of accounting paraphernalia which facilitates the work very greatly. It is desirable, after a standard system has been adopted, that daily reports of labor and materials be made. Service charge records should be made in triplicate by means of carbon copies instead of the cumbersome ledger system frequently used. Records of disbursements can be made best in the form of carbon-copy voucher checks. A simple method for handling the office fund or petty cash was described. Monthly summaries should be prepared according to the classification of accounts that has been adopted. The paper closed by calling attention to the fact that the science of public-utility accounting has been highly developed in the last few years, since public service commissions have taken control of the matter.

F. L. Dennis, South Bend, said that in the company with which he is connected the system described by Mr. Cady had been instrumental in reducing the labor connected with the handling of some 8,000 to 10,000 customers' accounts, so that now two clerks could take care of them easily whereas a large force was formerly required. Mr. Dennis strongly advocated the adoption of a uniform system of accounting in Indiana, something like those which



J. W. Robb,
President-Elect, Indiana Electric Light Association.

Mr. Robb, who has just been elected president of the Indiana Electric Light Association, has been a leader of this organization from its start. He is secretary and manager of the Clinton Electric Light & Power Company, of Clinton, Ind., and also secretary and treasurer of the Sullivan County Electric Company, which operates plants at Sullivan, Shelburn and Farmersburg. He started the plant at Clinton in 1891 and with the exception of a few years has been its executive head continually. Mr. Robb is a member of the National Electric Light Association and always keenly interested in the development of the central-station industry. Among his other interests, he is also secretary and manager of the Clinton Paving Brick Company.

had been chosen in Ohio and other states that have public service commission control. He said that a great deal of preliminary work along this line has been done by the Michigan state commission and a standard system of accounting will soon be adopted in that state. The Indiana companies should take up the matter without further delay. It is highly desirable to have meetings of the employees and explain to them why certain items are charged to various operating and capital accounts. No man can be a good manager of a utility company unless he fully understands the principles of accounting.

Street Lighting.

D. M. Diggs, of the General Electric Company, presented a paper entitled "Future Possibilities of Street Lighting." In the past the principal function of street lighting has been police protection; now the requirements are more numerous. The different sections of a city require different types of equipment. Mr. Diggs discussed the requirements for different districts from the illumination standpoint. In the principal business streets the illumination should be brilliant and uniform. This can be best brought about through the use of high-efficiency ornamental arc lamps to give a "White Way" effect and help to advertise the progressiveness of the city. Diffusing globes should be used and deep shadows avoided. A single high-efficiency lamp is better than a cluster of smaller units. He described the advantages of the ornamental luminous or magnetite arc and the pleasing effect produced by its use. Important cross streets should also be lighted so as to produce an ornamental effect, if sufficient funds are availabe, but the illumination need not be so brilliant. In residence districts the lamps should not be hung high because of interference of foliage; there should be at least one at each cross street or corner. In a pretentious residence district special efforts should be made to produce a pleasing effect in the street illumination. Manufacturing and warehouse districts need only on inexpensive type of arc lamp. Driveways and roads need only a very low illumination which should be well diffused; lamps need not be nearer than about 500 feet apart and should better be on one side of the road instead of hung over the center. In parks the use of flaming arcs widely spaced serves to illuminate very large areas at low cost. Mr. Diggs described some tests made in Boston that indicate a great superiority of luminous arcs over small incandescent units in observing approaching automobiles at a distance. He also described some tests of this kind made on a miniature scale, but with more varied conditions; these latter laboratory tests bore out very strongly the importance of the silhouette effect in the detection of vehicles along the street.

In reply to a question by President Bryan, Mr. Diggs said that for general street lighting the magnetite arc lamps are perhaps more serviceable than the flaming type of arc lamp. J. W. Robb, Clinton, described an installation in which a regular assessment had been levied by the board of public improvements so as to provide for a uniform system of ornamental street lighting. W. D. Ray, Hammond, said

that this is a very good plan. He has found that by the broad interpretation of a street-sprinkling law a municipality can levy a special assessment for ornamental street lighting and thus do away with the uneven appearance and frequent gaps that are met with when the matter is left entirely to the whim of individual merchants. At the request of T. F. English, Mr. Diggs explained the installation of luminous arc lamps in Baltimore, particularly as to the low cost of this installation. In general it has been found that merchants are very eager to start a system of ornamental lighting but seldom can get all of them to join equitably in meeting the expense, unless the city agrees to take over the cost of maintenance and operation. It is fair to expect the city to do so because the property owners in the business districts are paying a larger tax per foot than do those in the outlying districts.

Thomas F. English, Muncie, read a short paper entitled "The Proper Lamp for a Circuit." In this he strongly urged the use of tungsten instead of carbon incandescent lamps. The general use of tungsten lamps has been instrumental in a great increase of the standard of illumination and this has resulted ultimately in increase of revenue. The company should show its customers how to get the most out of their illumination and should help them solve problems of this character in order to get proper and satisfactory results. Such co-operation will result in making stores, business houses, etc., much more attractive, to do which will necessitate the more liberal use of the current. Central stations should also advise regular cleaning of lamps and glassware in order to maintain the efficiency at a high standard.

Election of Officers.

The Nominating Committee submitted a report which by unanimous action was adopted, the election of officers thus resulting in the choice of the following:

J. W. Robb, Clinton, president.

A. C. Blinn, Evansville, vice-president.

J. V. Zartman, Indianapolis, secretary-treasurer.

T. F. English, W. D. Ray, Thomas Donohue and T. F. Grover, executive committee.

C. C. Perry, T. C. McReynolds and F. A. Bryan, advisory committee.

N. M. Argabrite, T. A. Greist and J. W. Moncrief, finance committee.

The convention then adjourned.

A few special entertainment features were provided for the group of ladies present at the convention. The main feature in this line, however, was the banquet given on Wednesday evening. At this President F. A. Bryan acted as toastmaster and explained that in the unavoidable absence of the three speakers who had been expected, he would have to draw on the brilliant talent present. Responding to his request brief addresses were made by C. C. Perry, P. R. Poole, E. W. Kearns, W. R. Pinckard, J. F. Kerlin, N. M. Argabrite, T. C. McReynolds and D. L. Gaskill. Although most of the addresses were of a humorous kind the last two speakers dwelt with some seriousness on the value of association membership and of attendance at conventions. Mr. Gaskill explained some of the features that had been particularly instrumental in the great success of the Ohio conventions and in behalf of the Ohio Electric Light Association extended a cordial invitation to the Indiana central-station men to attend its next annual meeting.

Only a few exhibits were made at the convention this year, although the number of supply men and representatives of the manufacturers was larger than ever. The Duncan Electric Manufacturing Company, Lafayette, Ind., had a display of its numerous types of meters and also several transformers. The Esterline Company, Lafayette, showed some of its graphic recording instruments. Federal Sign System (Electric), Chicago, had on display several types of electric signs, electric washer, vacuum cleaner, power table, and other specialties. W. N. Matthews & Brother, St. Louis, showed cable clamps and anchors.

Electrical Illumination at Festival of Mountain and Plain.

Electricity wielded a mighty influence in the production of Denver's Festival of Mountain and Plain which has been revived after eleven years and was held from October 15 to 18. In fact it is doubtful whether the carnival of 1912 would have been the grand success it was if electric current had not taken such a prominent part in the creation of artistic floats and for illumination purposes. Denver has been thrilled and awed at different times by the spectacular productions of the electrical engineer, but never in the history of the city has there been anything which aroused so much enthusiasm and so well showed the varied application of electric power.

In so far as the electric industry is concerned the Mountain and Plain Festival of 1912 marked an epoch in its growth. It represented in striking fashion the wonderful development which the business has undergone in the last decade. In contrasting carnivals of other years, when electricity was not so well applied in the West and when flaming torches furnished the only means for the illumination of the night parades, the great strides which the industry has made in Colorado in ten years become plainly evident.

There were greater facilities at the command of the merchants and business men of the city for decorative purposes than ever before. The city fairly shimmered in its holiday dress of thousands of electric lamps fashioned after a variety of patterns. The merchants of Denver have evidently kept abreast of the times in electrical development and were quick to realize the increased facilities at hand to make their establishments sparkle at night and eagerly grasped the opportunity to deck their places of business with light. There seemed to be a certain civic pride that gripped every one and all were anxious to do something to enhance the beauty of the city. This spirit was born, no doubt, from the educational lighting campaigns which the Denver Gas and Electric Light Company has conducted at different times.

Long before the date set for the commencement of the festival the entire supply of stringers of the Denver central station was exhausted and merchants who had been slow to proceed and issue orders for decorative electric lighting found themselves at the eleventh hour minus the all important decoration—the light. When confronted with this proposition there was but one alternative left them that of utilizing signs, outlining effects and windows. In these were installed the carnival-color lamps—red and yellow.

For the most part the cafes, saloons, restaurants, hotels, drygoods concerns and moving-picture shows were the largest users of decorative lighting. In these particular instances thousands of additional lamps on stringers were erected. Canopy effects were most generally used. Stringers were hung from the roofs of the buildings out over the sidewalks forming great overhead domes of light. Other forms were in connection with flags and flowers and stringers hung from the roofs in draped effects.

The Hedgcock-Jones Company and the Gano-Downs Clothing Company had the most beautiful lighting productions. The former covered the front of its building with birch-bark and paper floral decorations.

A large electric sign, with red and yellow lamps in it, spelled out the name of the company and in between the artificial flowers clusters of incandescents combined in making a very beautiful rustic effect.

Gano-Downs used an entirely different plan. Stringers of red and yellow, laid

over bunting of the same colors, were suspended from the roof of its building, forming vertical shafts of colored light 40 or 50 feet high. In the upper windows, which are about fifteen feet wide and ten feet high, the same color effect was carried out by inclosing the colored lamps with hemispherical globes.

The top-most dome of the Daniels and Fishers Stores Company tower was outlined with red incandescents and at night from a distance it had the appearance of a gigantic outlined bell suspended in mid-air by some unseen force.

As usual Carter Street took the lead in the matter of illumination. The many cafes, saloons and theaters along this thoroughfare contributed a great deal towards the beautification of the street. The other street lighting on Fifteenth, Sixteenth, Seventeenth and Champa Streets was done by suspending red lamps from the Tramway Company poles in stringers and portiere effects.

Lily Float Used in Colorado Electric Club Parade.

In the industrial parade held on the first day of the festivities the electric truck took an important part. Several floats were built on the machines owned by Denver concerns. The electric pleasure vehicle also took its place in the parades. Machines of this type formed a special section of the automobile parade held on the afternoon of October 16. A prize of $100 was offered for the best decorated electric.

The Colorado Electric Club since its inception three years ago has always been behind any movement that would tend towards the upbuilding of the city or state. It has always been foremost in bringing electrical matters to the attention of Colorado residents. It was a matter of deep concern for the directors of the Mountain and Plain Association to hit upon a plan that would easily prove the bright shining feature of the festival. The Colorado Electric Club had produced two monster electric shows and was well qualified to create something of an electrical nature that would prove a thriller. Accordingly the carnival directors appointed the club to officially take charge of a parade which was given on the evening of October 17.

The members of the Electric Club worked untiringly on a feature which was the most gorgeous spectacle ever seen in the West. Fifteen floats, costing in the neighborhood of $10,000, which had been under erection for more than a year, were brought to Denver. They were manned entirely by over 200 members of the Electric Club, costumed to suit each float. Over 200,000 people witnessed this spectacle and it was cheered to the echo as it passed along the streets. These floats were entirely electrical.

At the head of the procession rode the carnival directors on horses and upon the forehead of each animal a tiny electric lamp lighted by means of a dry battery winked like a star. Following this part came the floats. The current for illuminating them was secured by means of a trolley connected to the wires of the Tramway Company. In front of the grand stand on the State Capitol grounds there were no tramway lines from which to secure current to light the floats, so arrangements were made with the officials of the Denver City Tramway Company and a temporary wire was erected. On the wheels of each of the floats there was a flange to keep it in the tracks, so that the trolley would not slip off the wire. At the reviewing stand a cable was used to guide the floats.

In the first section were floats depicting a variety of precious stones such as the sapphire, emerald, topaz, amethyst, pearl, diamond, ruby and coral. Popular flowers were also reproduced in this section. They were the pansy, lily, rose, tulip, poppy, chrysanthemum and others. The electrical effects used in the portrayal of the different stones and flowers were gorgeous and wonderfully true to nature. The characters, such as Romeo and Juliet on the Rose float, those in the Dutch garden scene and windmill in motion on the Tulip creation, and others were all members of the electric club. Between the floats rode horsemen, members of the club, costumed to imitate the Jack of Clubs, English soldiers, French cavaliers, American Indians, Mexicans, Shakesperian knights and Spanish toreadors.

J. M. Mulvihill, chief clerk of the Denver Gas and Electric Light Company, had charge of the arrangements for the electrical parade and it was due to the untiring efforts of himself and the committee which served with him that the success of the undertaking is due. J. T. Brady, treasurer of the company, served as a member of the Festival Association. He did a great deal to encourage elaborate decoration with light during the week. Upon his suggestion the illumination at the grand stand was turned out when the electrical parade passed so that the occupants might see the beautiful effects the better.

It is probable that the Electric Show which will be given by the Electric Club next year will be held at the same time as the Carnival, thus affording the many visitors to the city an opportunity of seeing both festivals.

In consideration of the support given the directors of the Mountain and Plain Festival Association, the committee made public the following statement thanking the various individuals and utilities for the help extended in making a success of the project:

"The sincere and most abounding thanks of the board of directors are due everyone who so generously and lavishly assisted in the work of making the carnival the grand success it was—to the press of the city—to the Denver City Tramway Company for untold help in constructing roads, tracks and every facility needed—to the Denver Gas and Electric Light Company for its many, many favors—to the Mountain States Telephone and Telegraph Company for its courtesies—to the Colorado Electric Club for its great assistance in the illuminated night parade, of which it made a most magnificent success."

Carrying The Motor to The Work.

Of the many advantages of electricity as a means of furnishing power for various operations, probably none is more far-reaching in its effects than the ability to bring the power right to the work. In the earlier days of the electrical industry, the use of motors was confined largely to the same purposes for which steam, gas or gasoline engines had formerly been employed. Consequently, the old practice of having the motor rigidly fastened to a floor or ceiling and a corresponding stationary machine operated by the same, was customary at first and persisted for years. Indeed, the handicaps of the immovable engines still haunt a good deal of the machinery apparatus now driven by electric power, for it takes time and initiative, as well as foresight, to enable machinery builders to break away from their established rules.

However, in one line after another, builders of electrically driven appliances and machines are learning that even motors of considerable size and power may easily be mounted so as to be movable; and that for many classes of operations it is a decided advantage to bring the motor to the work, thereby reversing the older method of procedure. By doing this, electric motors can easily be used not only in places where it would be cumbersome and often impractical to employ any other source of power, but also in ways to which the other sources would not readily lend themselves. What a wide range of adaptability this means and how it immediately opens up new methods of operating tools for various classes of work, can be seen from the accompanying illustrations.

Fig. 1 is a glass-shade washing and drying machine devised by the electrician of the Federal Building at Chicago for economically cleaning and polishing the glass reflectors used over the incandescent lamps in that building. It consists of a truck supporting two tanks, in one of which a motor-driven propellor churns the water and dashes it through and around the glass shades piled in a wire basket above it. The same motor also drives a fan for propelling the hot air which dries the washed shades in the other tank, while a buffing wheel on the other end of the motor shaft allows the dried shades to be given a final polishing. Thus the compact outfit offers a wider range of

Fig. 1.—Shade-Washing Machine.

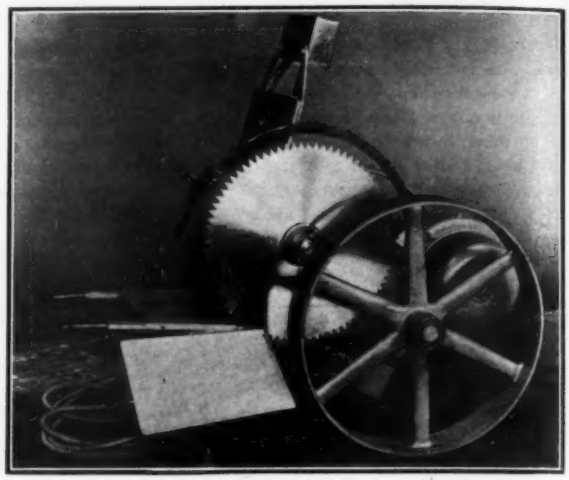


Fig. 2.—Paving-Block Saw.

Fig. 3.—Emery Wheel.

Fig. 4.—Motor in Hub.

usefulness than that commonly found in a good-sized stationary equipment, yet it is portable and easily taken to any part of the building.

While this glassware-cleaning outfit is typical of the new additions gradually accruing to the general line of sanitary appliances, of which our portable electric fans and vacuum cleaners are common examples, a similar evolution may be found among the motor-driven tools designed for a variety of special uses. For many purposes flexible shafts are still the favorite means of providing the required adaptability, but they no longer form the only means for securing the desired range of motion in the motor-driven tool. Indeed, the driving motor itself may easily be so compact and so light that the required adaptability may be obtained to better advantage by swiveling the mounting of the motor. When this is done with a motor supported by a light cart, as in the emery grinder shown in Fig. 3, a single workman can easily grind the rough spots on castings which it would be difficult for several men to handle by the old method of taking the casting to the wheel.

Even on self-propelling vehicles, the propelling motor, while necessarily carried upon the truck, may in one sense of the word be at a considerable distance from the wheels through which it does the propelling. Usually, the separation is readily spanned by a mechanical transmission. But in some types of trucks a gasoline engine drives a dynamo which supplies current to electric motors, thus introducing almost as extensive a power-transmission system as is commonly used when the motors are many rods or even miles, from the source of energy. The ease of control obtained by such an electric transmission emphasize the general advantage of having an electric motor as the final element in a power equipment, and of having it as close as possible to the point at which the power is to be applied. Even in storage-battery trucks the intermediaries can be omitted and the motor brought right to the work by building it into the hub of the drive wheel, as shown in Fig. 4.

Still another example of the way in which portable motors may alter and improve industrial methods is shown by the paving-block saw in Fig. 2, which is used on the streets for trimming wooden paving blocks to the exact size needed for filling gaps. A large number of the faulty spots in wood pavements are generally due to the poor fitting of the blocks wherever the spaces are angular or too small for the regular size of the sawed blocks. By doing the fitting with the exactness of a circular saw, instead of trimming the blocks roughly with a hatchet, the durability of the pavement can be greatly increased, the cost of the needed current being quite insignificant as compared with the saving in repairs effected by the better fitting of the blocks.

Thus the ability to take the motor to the work in various lines has brought forth new ways of utilizing electric power which are not only interesting in themselves, but which also should point the way for a much larger number of equally novel possibilities in the saving of labor and the improving of industrial processes.

BOOK REVIEWS.

"Engineering as a Vocation." By Ernest McCullough. New York: David Williams Company. Cloth, 201 pages (5½ x 8 inches). Supplied by the Electrical Review Publishing Company for $1.00.

The aim of the book as stated in the preface is to inform parents "in order that they may act wisely in selecting a career for their sons." The author, in the first two chapters on "The Engineer" and "The Work of the Engineer," traces the development of the profession and defines its work. The differentiation between the military and civil engineer, and between the civil engineer and mining engineer, mechanical engineer or electrical engineer and the origin of the schools of engineering are traced historically. The difference between the method of teaching and the work of the engineers of different countries is set forth. The plea for a general form of education rather than for training in specialties is important.

Under the heading of the third chapter, "The Education of the Engineer," he shows how a man may be prepared in the usual and best way by 16 to 18 years of school work before graduating from the technical school, by evening schools or correspondence schools or by self study. He shows the difficulties of the last two methods and the dangers resulting from such preparation and the prejudice in favor of the practical man against the so-called theorist, who is, in fact, the true practical man. The author shows the great need of better high-school work and sketches the various courses necessary to be pursued for the correct training of the engineer. Several typical courses of engineering are given with the number of units for each subject. A strong plea is made for a broad, thorough fundamental training and the elimination of specialties until the student knows himself. The desire for electives in the liberal arts and political science in its various forms is commended. This chapter has much excellent material, but in the latter part of it the author undertakes to criticise the methods of engineering schools and this, although just in many cases, is not pertinent in a book with this aim. It is not helping the parent to understand the profession, its aims and its limitations, to have a dissertation which can be understood only by those who are or have been students in these schools. The criticism is unjust to many schools in which the young engineering instructors receive as large salaries as their classmates on graduation and who are picked for their special ability as students or teachers. That too much inbreeding has a weakening effect on the work is undoubtedly true and the suggestion that the almuni (not alumnae in most of our schools) be asked to aid the president by reporting in the fifth year after graduation their opinion of the various members of the faculty is a unique scheme and one which would probably prove of value.

The possibility of the high school doing some of the preparation for the engineering work of the future is already an established fact, for from the manual training schools many engineer's assistants are taken annually.

The subject of home study is given a chapter and the author discusses the limitations and disheartening features of such work. The fact that the work of the evening institute is done in a hurry and so arranged that it will fit immediate needs rather than future developments is clearly shown. That few finish these courses or the correspondence-school courses is shown to be quite natural. The author gives a list of books for the man intending to do home work, although the value of some of them to the man studying alone may be questioned.

Under the chapter title of "How to Hunt and Hold a Job" the author gives many valuable suggestions and the advice is good.

The last chapter discusses the question "Does it Pay to Study Engineering?" The author paints the troubles and hardships of the engineer as a result of hard times and of the employment agency owned by persons in charge of the employment of men for corporations, and the injustice which may be done when men are discharged so that the agency may have "jobs" to fill. The temporary nature of the work of some engineers is set forth. Two curves are given showing the pay of graduate engineers from two institutions and if these can be true there is every encouragement for the young engineer, and things should not be as dark and unpromising as the author would indicate. The same difficulty in reaching the top of the ladder could undoubtedly be stated for the other professions. The author states though that the study of engineering, if of a broad nature, does

train a man for business or other lines of life work, and is of value.

The statement that the general education of the civil engineer is perhaps the best fitted to prepare a man for engineering work cannot pass unchallenged. That civil engineering as practiced today is broader than her sister branches of engineering cannot be proven. The term now has as restricted a sense as mechanical engineering. All engineering training should be broad. The book closes with extracts from certain editors on the calling of the engineer.

It is a valuable book for those desiring a clear conception of engineering and outside of one or two minor matters is admirably adapted to the purpose set forth in the preface. It may be that the author had in mind the fact that the discussion of his ideas on the method of teaching, the teaching body, the employment agency and the graduate apprentice system of many of our manufacturing companies would give the parent a clearer view of the profession and one's preparation for it, but to the writer these things seem foreign to the matter in hand.

ARTHUR M. GREENE, JR.

"Electric Traction for Railway Trains." By Edward P. Burch. New York: McGraw-Hill Book Company. Cloth, 569 pages (6x9 inches), illustrated. Supplied by the Electrical Review Publishing Company for $5.00.

The many unique features of this book attract the engineer immediately. Foremost among these is the tabulation of vast amounts of data concerning electric train operation, which is of exceptional value for reference purposes, while the concise form in which its statements are set forth without padding, or in many instances, without correlation of sentences and paragraphs, is most striking. For these reasons it is not suitable as a textbook, but is most useful as a compendium of information regarding this particular phase of electrical traction.

The subject matter is introduced with a most complete and excellently illustrated history of electric traction, followed by a rather detailed study of the various modern types of steam locomotives, setting forth their characteristics and laying particular emphasis upon those features in respect to which the electric locomotive is later shown to be superior. The advantages of electric traction for trains are then considered from the engineering, social and esthetic viewpoint. A very strong case is presented in favor of electric traction, based upon much tabulated data of operating costs of electric systems installed at the present time. Having established the demand for electric traction, the various available systems in use in this country and abroad are discussed, together with a comparison of their relative merits. All the prominent installations are listed, with a record of the equipment of each. Whereas it is quite clear that the author is an ardent advocate of electrification of steam railways from his comparison of steam and electric traction, the advantages and disadvantages of various types of electric systems are very impartially presented. "Electric Motors for Train Service" and "Motor-car Trains" are the captions applied to the two following chapters, devoted largely to well illustrated descriptions of equipments in use upon American and European railways. A complete chapter is allowed each type of electric locomotive. The only chapter which can be considered theoretical is one entitled "Power Required for Trains" in which the mechanics of train operation is reviewed and the factors entering into the determination of speed-time curves outlined. The effect of frequency of stops and rate of acceleration upon energy required by the train are discussed. An outline of the necessary procedure to be undertaken in electrifying a steam road, together with a progress report setting forth the present status of the development, concludes the book.

One of the most commendable features of the work is the very complete bibliography listed for each chapter. When combined these publications represent practically everything of value which has been written upon the subject of electric traction up to 1911. While the preponderence of descriptive matter is rather marked in the book, it will be valued by engineers as a most concise summary of heavy electric traction to date and the vast amount of engineering, operating and financial data contained therein will be welcomed by railroad engineers and students alike.

C. FRANCIS HARDING.

"Tables and Other Data for Engineers and Business Men," seventeenth edition. Compiled by Charles E. Ferris. Knoxville, Tenn.: University Press. Flexible leather, 248 pages (2¾x5¾ inches). Supplied by the Electrical Review Publishing Company for 50 cents.

This manual for engineers contains mathematical tables, wiring tables and other tables of interest and value to the engineer. It is published by the University of Tennessee and contains considerable information about the University, and also contains a number of advertisements of manufacturers. Additional data have been added to this edition and former errors corrected. The binding is excellent and the volume is of convenient size for the pocket.

A NEW METALLIC-VAPOR LAMP, GIVING WHITE LIGHT.

By M. Wolfke.

The great disadvantage of mercury lamps is the deficiency of the light in red rays. This is due to the peculiarities of the mercury spectrum. A number of attempts have been made to remedy this defect, but they seem to have been unsuccessful. The obvious way seems to be to supplement the mercury by something else, or perhaps to replace mercury by some other metal giving a more suitable spectrum. The author, working with C. Ritzmann, therefore tried the idea of using alloys, which are solid at ordinary temperatures, to act as the light-emitting agents.

At first the most hopeful prospect seemed to be held out by using easily fusible alloys. Wood's alloy was tried, and then a series of alloys containing bismuth, zinc, cadmium, lead, thallium and mercury in quartz tubes. These experiments showed that it was not so much the fusibility of the alloy which was important, as the point of volatilization. This is not only on account of the efficiency, but also on account of keeping the walls of the lamp free from a deposit of an opaque metal. The temperature of the walls must therefore be sufficient to volatilize the metal. Moreover, the metals must have no chemical affinity for quartz. This excluded all except zinc and cadmium. The former had been tried by Gehrcke and von Bäyer, the latter by Stark and Küch. The temperature of volatilization of zinc in a vacuum is 560 degrees centigrade, and of cadmium 450 degrees. Both metals were very thoroughly tested; but zinc gave poor results, and we were therefore limited to cadmium.

Cadmium does not act on quartz, and, even after the lamp has been burning for weeks, the walls of the lamp seem quite unaffected. The slight coating of the walls, which takes place after the lamp has been extinguished, disappears when the lamp is lighted again. But it is very necessary that the cadmium should be pure, and free from oxide, and the lamp must therefore be filled under a vacuum. From the known spectrum of cadmium, it can be seen that there is a deficiency in the violet, yellow and extreme red. But with the normal lamp, the red line increases in brightness very rapidly with the rise in temperature, and this is so noticeable that a lamp filled with pure cadmium gives a markedly red light. This difficulty is removed by the addition of a small percentage of mercury. Such an addition of mercury to cadmium gives an even distribution of the bright lines over the whole range of the spectrum.

1 Abstract of an article in the *Electrotechnische Zeitschrift*.

The amount of mercury which is necessary varies from 3 to 10 per cent, according to the shape and size of the lamp. A sort of fractional distillation allows the adjustment of the amount of mercury in any particular case, and this can be done before the lamp is sealed off. The color of the light obtained in this way is quite satisfactory, and is a great improvement on the ordinary mercury light.

Measurements for efficiency were carried out on two kinds of lamp. The first kind had an anode of graphite and the second of the cadmium amalgam, the kathode in both cases consisting of the amalgam. The first kind was found to be far less efficient than the latter. The graphite type may therefore be left out of consideration, but it may be said of both types that a considerable output of light is necessary before any satisfactory efficiency is reached. It has been often asserted that the efficiency of a lamp using an amalgam must be less than that of one using mercury. But this does not seem to be the case, in so far as our figures go, when compared with those obtained by Küch and Retschinsky on mercury lamps. Table I gives comparative results.

TABLE I.

	Cadmium amalgam.		Mercury.	
Total Watts.	Candles.	Watts per candle.	Watts per candle.	Watts per candle.
150	150	1.00	0.87	....
220	310	0.71	0.68	0.89
300	590	0.51	0.47	0.64
380	960	0.40	0.34	0.45
540	2,370	0.23	0.23	0.29
620	3,800	0.16	0.21	0.25

The table gives two columns for the watts per candle[2] of the mercury lamp, and these are taken from two sets of experiments by Küch and Retschinsky. The table shows that the efficiency of the cadmium-amalgam lamp is very similar to that of the mercury lamp, but ultimately reaches a slightly better value, namely, 0.16 watt per candle, as compared with 0.21. The cadmium lamp, however, was found to take more current for a given voltage than the mercury lamp, at least at that part of the curve which gives a reasonable efficiency. But this can be overcome by using very small vessels for housing the electrodes. The cadmium-mercury lamp, like the mercury-vapor lamp, needs a certain time to settle down, during which time the voltage, watts and candlepower increase, while the current and the watts per candle decrease.

The method of starting the lamp presents certain problems to be solved. The following methods may be mentioned. One method is to use a small induction coil, giving a spark of 10 millimeters, in combination with an auxiliary anode. A Wehnelt kathode may be used, depending on the known property of the oxides of calcium, barium and strontium, when hot, to emit negative electrons. An auxiliary arc may be used, operated by an external agency, or an electromagnetic method may be employed. The two best methods yet discovered are as follows. In the first case, the anode consists of a block of graphite, flexibly attached to a small iron chain by means of which it is connected to the outer terminal. On tilting the tube, the graphite block can be made to come in contact with the amalgam kathode; the arc is started by tilting the anode back again, leaving the lamp to burn in its normal position.

The second method consists in mounting a contact ring within the wall of the tube, in the neighborhood of the kathode, this contact ring being connected by a carbon filament of high resistance to the anode. When the lamp is extinguished, the walls of the tube are covered with a thin conducting deposit of cadmium. This is sufficient to connect electrically the contact ring to the kathode; the result of the passage of current is that the conducting film of deposit is volatilized, and this causes the arc to start. The second method is very simple, and it is probably the most likely way by which lamps of this type can be started.

[2] Hefner unit, equals 0.9 international candle.

A Novel Guessing Contest.

In connection with the electrical exposition held at Boston, September 28 to October 26, the Electric Development Association of Boston held a contest to guess the contents of a globe holding a certain amount of money. The idea was to guess the number of pieces of money in the globe, the first prize being the globe of money, the second prize a table lamp, the third prize an electric radiator, the fourth prize an electric chafing dish, and the fifth prize an electric coffee percolator.

Upon the card issued by the Association there were three coupons, one pledging the recipient to call upon an electrical contractor, dealer or the lighting company during the month of October to ask about the utility of electricity in the home and about the cost, convenience and practicability of modern electric devices, or the use of the electric commercial or pleasure vehicle. The second coupon was deposited with the contractor, dealer, or lighting company, and the third contained the name and address of the holder. There were 9,261 slips signed and it is estimated that over 7,000 of these were the names of good prospects for future business. There were 1,648 of the slips turned in by the public to dealers, contractors and central stations throughout New England. The coupons deposited with the various interests were turned in to the Electric Development Association from 478 different dealers and contractors. A number of reports has been received showing direct sales made as a result of the calls incident to the depositing of the registered guesses.

Investigation of Chicago Telephone Company by City Council.

The report of E. W. Bemis, the public utility expert engaged by the City Council of Chicago, Ill., to report on the telephone service and rates of the Chicago Telephone Company, has been presented to the Council. This is the fourth inquiry instituted by the City Council. Under the company's franchise granted in 1907 and extending to 1929, the City Council has the right to adjust rates every five years.

The report suggests a reduction of $700,000 a year in the present charges. This is treated as a general proposition, and the report does not show how the reduction should be spread among the various classes of service. The report also recommends the creation of a municipal telephone complaint bureau to handle all complaints regarding service from subscribers. Further recommendation is made with regard to the matter of rentals and a reduction in the dividend rate is suggested. The report is now being discussed by the City Council.

Central Stations Fleeced by Promoters of an Alleged Process of Manufacturing Tool Steel by Electricity.

W. G. Eager, of the Valdosta Lighting Company, Valdosta, Ga., advises that swindlers have been fleecing central stations in various parts of the country by the use of the following method. A foreigner, dressed in fashionable clothes, with a signet ring, gold-headed cane, etc., drives up in a carriage and tells the manager that he is representing his father who is a large iron manufacturer in France or Germnay, as the case may be, and that they have discovered a process of manufacturing tool steel by electricity, and contemplate the establishment of a plant in this country to use electric power, and would like to figure with the company on rates. After interesting the central station in this way, it is suggested that the company order a few sample bars of the tool steel at "55 f. o. b." that town. After the order has been placed, 18-foot bars of ordinary tool steel will be shipped from the nearest jobber, sight draft drawn on the bill of lading and negotiated, and the holder comes back on the central station for the cash involved. Tool steel in bars of 18 feet at 55 cents a pound runs to a considerable sum of money and offers quite a little profit to the promoter of the scheme.

New Electrical and Mechanical Appliances

A New Color-Changing Device for Lamps on Electric Signs.

The Reynolds Electric Flasher Manufacturing Company, of Chicago and New York, well known manufacturer of flashers and electric-sign accessories, has recently placed upon the market a novel and practical patented invention in the shape of a lamp hood or shade, by which means color schemes and effects are produced in electric signs and displays. The cap or hood is made of various colored glass, such as ruby, amber, green, opal and frosted. The hood slips over the lamp bulb easily and is firmly held in place by means of a non-corrosive weatherproof spring device.

Color schemes and effects, almost without limit, are possible with these Reco colored lamp hoods. Changes can be made from time to time, as the cap can be removed from the lamp quite as easily as it is put on. The cap can be used many times over, since it does not deteriorate. Pure colored glass is used which is exceptionally clear and transparent, thus cutting down the light but very little.

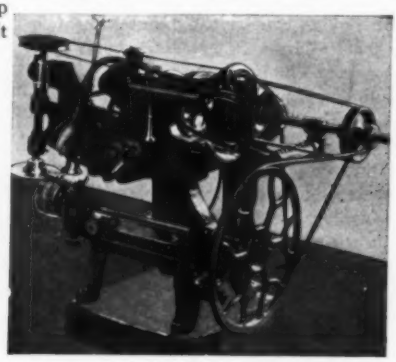
Reco Color-Changing Hood.

The advantages of a lamp hood over natural or artificially colored lamps are obvious, as the first named are very expensive and the color of the dipped or stained glass does not last, and estimating the cost of redipping, the lamp hood is found far cheaper. Furthermore, laboratory, as well as practical tests, have shown that the life of colored bulbs is reduced on account of the greater absorption of colored glass and resulting higher temperature, causing the filament to burn out more quickly. The Reco colored lamp hood enables the use of clear lamps, and provision is made for ventilation. The standard size fits any lamp having a bulb diameter of 1.75 inches, including all the sign lamps most commonly in use.

Large electric signs invariably require colored effects to tone up the display and Reco lamp hoods are very desirable for work of this kind, as well as for street and other decorations too numerous to mention.

Holophane Works Acquires Permel System.

The Permel system of specific lighting units is a simple solution of the lighting problem, which has always been serious in the shoe manufacturing and similar industries. Such operations as stitching, skiving, eyeletting, vamping, embossing and buttonholing require a very high intensity of illumination over a very small area. To secure the necessary light without waste, and without handicapping the operative with an excessive amount of glare was not easy until the Permel unit was developed.



Permel Unit Applied to a Machine.

The essential part of the Permel fixture is a scientifically designed reflector-socket only 2.125 inches in diameter, accommodating a special Mazda lamp. This reflector-socket is welded to a substantial brass tube which carries the wires to the lamp. This brass tube is so bent as to fit closely the body of the machine for which it is designed and to which it is securely fastened by metal straps, so that the entire unit is not only a solid piece, but practically becomes a part of the machine. Tubing of proper shape and special fastening straps are provided to meet the requirements of all types of machines requiring specific lighting.

The lamp used with the Permel unit has a 6-volt, 5.5-watt tungsten filament, rated at 4 candlepower. A bayonet-type candalabra base effectually prevents the lamp from jarring loose from its socket.

The design of the reflector is such that this lamp gives 8.7 candlepower directly under the unit, this being equivalent to the illumination given by six 60-watt carbon lamps equipped with good reflectors and hung 3 feet above the table.

The Permel system has been rigorously tested in service and has met with general, even enthusiastic, approval. It is economical both in installation cost and maintenance, and gives no trouble of any sort. Its greatest advantage, however, lies not in the substantial economy from a lighting standpoint, but in the fact that it helps the operative to do more and better work. The light is concentrated where the worker wants it; the unit is so small and snug that it actually becomes a part of the machine; there are no shadows, no flicker from vibration and no striations. The comparative records of one factory, which made an experimental installation of Permel units, showed that the after-dark output of the machines so equipped was 14 per cent greater than the output of machines lighted in the usual way, and that the quality of the work was correspondingly higher. Such an increase in efficiency is an argument which no factory manager car ignore.

Spot Illumination Produced.

The Permel system has been acquired by the Holophane Works of General Electric Company, and in future will be marketed by that organization.

Perpetually Self-Oiling.

The following story, illustrative of the dangers of technical terminology, is attributed to one of the branch-office

managers of the Crocker-Wheeler Company.

"One of our men sold one of our small motors to the owner of a sweatshop in a large western city about ten years ago. The other day he met the sweatshop owner and asked him how the motor was behaving.

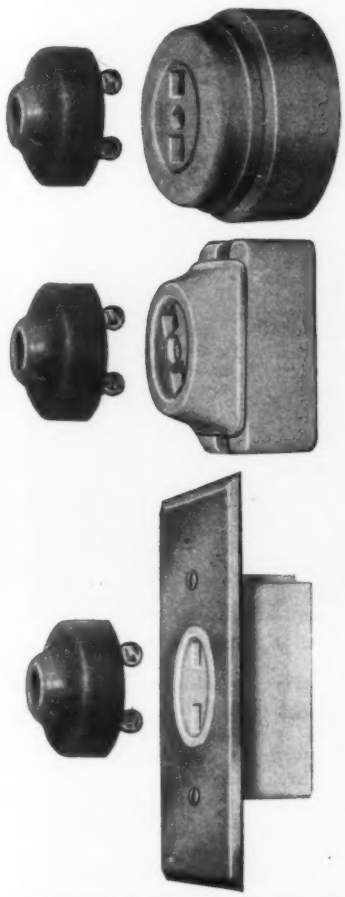
"'I hardly ever see it,' replied the latter. 'It is upon a shelf in the corner of the room, and I don't bother with it, only to turn it on and off.'

"'How often do you oil it?' inquired the salesman.

"'Oil it? Why, I never oil it. You told me when you sold it to me that the motor was self-oiling!'"

New Attachment-Plug Receptacles.

The attachment-plug receptacles illustrated herewith have recently been

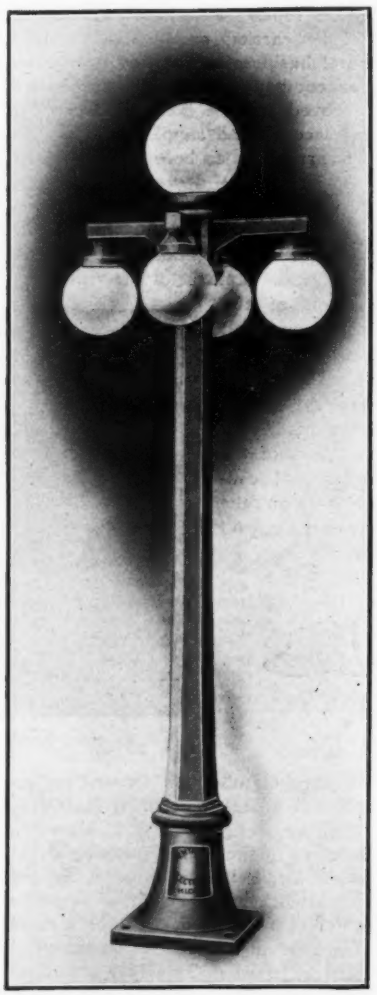


Three Types of C-H Attachment-Plug Receptacles.

developed by the Cutler-Hammer Manufacturing Company, of Milwaukee, Wis., to fit in with its line of attachment plugs. The caps of these plugs can be used with any of the three types of receptacles shown. The round-base receptacle is for use with concealed wiring, while the rectangular-base type is particularly suited for use with molding work. Porcelain or black composition caps are provided, although where the C-H plug is already in use, the same cap can be used for plug and receptacle. The increasing use of household heating devices and small motor-driven devices has created a demand for receptacles of the types shown for wall mounting, because it is not always convenient or desirable to plug into the fixture sockets.

Central Ornamental Lamp-Post.

The Central Electric Company, 320 South Fifth Avenue, Chicago, has placed on the market the type of five-light ornamental cluster post illustrated



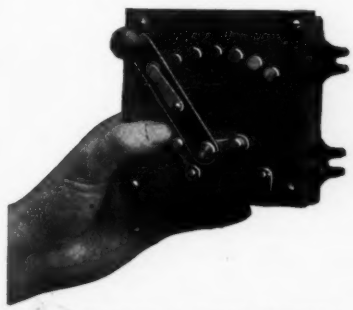
Central Electric Company's Cluster Post Design.

herewith. The post consists of three main cast-iron parts, base, hexagonal stem and head with arms. These three parts are easy to ship and handle; on erection they are securely joined together. Massive simplicity was aimed at in the design and the completed posts are impressive in appearance. The dimensions in all details are in good proportion. Repainting is easily done on account of the absence of elaborate decoration. The entire design is modest in outline and also in price.

A 16-inch diffusing globe is used for the top lamp and 12-inch globes for the side lamps. A switch or cutout can be placed inside the door in the base. The full height of the post, inclusive of the upper globe, is 13 feet, 3 inches. Opposite globes of the side arms are 32 inches center to center. The hexagonal stem tapers from eight to six inches. A hexagonal base can be supplied, if desired, in order to match the stem.

Independent Midget Speed Regulator.

In order to meet the growing demand for a small and substantial motor-speed regulator the Independent Electric Manufacturing Company, of Milwaukee, Wis., has developed a little device termed the Midget speed regulator. This regulator is about 4.5 inches square and intended for the speed regulation of small motors such as are commonly used on jewelers'



Midget Rheostat or Speed Regulator.

lathes, dentists' drills and lathes, washing machines, adding machines, etc., and is also employed as a small field regulator, heating regulator and in numerous similar places where a small rheostat is necessary.

The front of the Midget regulator consists of a handsome slate panel on which there are mounted the contacts, operating lever and two terminal posts. The operating lever, which is of steel, is equipped with a handle and fitted with a brush held tightly against the contacts by means of a strong spring. The casing is of cast iron, dustproof and moistureproof, and contains the resistance units.

The resistance of the Midget regulators consists of a high-grade special wire wound upon a slate core covered with a special cement and baked, making it absolutely moistureproof and dustproof.

The resistance unit is mounted on the back of the regulator so that the removal of the front carries with it the

resistance from the casing, allowing it to be easily replaced whenever necessary without the necessity of replacing any other part of the rheostat. This regulator is built to operate motors from one-twentieth to one-sixth horsepower.

A Slide Rule for Electrical Engineers.

A new slide rule to facilitate the computations of the electrical engineer has been devised by King G. Kellogg, Philadelphia, Pa. This slide rule has two slides and the scales are so marked that computations involving Ohm's law and similar relations between voltage, current, etc., can be performed directly with the rule.

This slide rule, consequently, is applicable to computations involving (1) multiplication, division, etc., as on the ordinary slide rule; (2) electrical calculations involving the relation between energy, length, size and temperature of conductors, or involving the relations between dimensions, resistance and temperatures; (3) efficiency of dynamos, motors, etc. The slide rule is not applicable to cases in which inductance enters.

The Pianolite.

The Franks Manufacturing Company, Rock Island, Ill., has added another lamp to its list of quick sellers. It is the Pianolite, an attractive little lamp, beautifully finished in brushed brass, of six candlepower. It has a miniature shade, which throws a splendid light on the music and keys and brings out clearly and distinctly the printed matter on the page before the performer, whether pianist or vocalist.

Franks Pianolite Fixture.

At first thought, it may appear improbable that six candlepower will be enough light to make the reading of the music easy, but experience has proved that a lamp of higher candlepower placed at such a close range to the printed page, will cause glare, without adding to the distinctness, and there is a consequent undesirable effect on the eyes. The low candlepower used in this lamp means a considerable saving in light bills. As this dainty little lamp makes a handsome ornament for any piano, nothing could be more suitable as a gift.

The company also makes a round shaving or boudoir mirror with circumferentially adjustable lamp.

Reorganization of Guarantee Electric Company.

Announcement is made that the Guarantee Electric Company, of Chicago, has been reorganized and will conduct the business of the original company at the same address and under the same name as heretofore. A. T. Walcott, H. G. Nes and F. L. Carl, who are responsible for the reorganization, were all connected with the old company. Mr. Walcott will continue as shop superintendent, Mr. Nes in charge of the accounting department and Mr. Carl, who was purchasing agent for the former company, will act as sales manager.

The reorganized company will maintain an enlarged repair department where repair work of all character will be carried on. The extensive rental business established by the former company will be continued and improved and the general sale of new and second-hand supplies and machinery carried on as before.

A Striking Float in the Sons of Jove Parade.

One of the very interesting and highly enjoyable features of the recent convention of the Rejuvenated Sons of Jove at Pittsburgh, was the torchlight parade of members of the order and candidates on the evening of Tuesday, October 15. One of the conspicuous floats was that of Hubbard & Company, designed by C. L. Peirce, Jr., manager of the Peirce specialty department. Mr. Peirce was one of the most active workers on behalf of the entertainment committee, and took a prominent part in the entertainment of the visiting Jovians. The float attracted a great deal of attention for originality in conception, and helped materially to create the fine impression which attended every phase of the convention.

Hubbard Float in Jovian Parade.

Display Lighting in a Big Department Store.

When the big, new Bamberger Store, in Newark, N. J., was planned, first consideration was given to secure an interior fitted only with equipment which would prove in every way adequate to the demands of a truly modern shop. Commodious aisle space, ample display cases and fixtures, commanding street show windows and other features were planned with particular relation to the psychological effect upon visitors to the store. Foremost amongst other essentials was the consideration of most effectively illuminating the goods displayed.

The interior show cases, used throughout the store, aggregate a total of 3,865 feet. In the upper front corner of these cases were fixed Frink standard-type case reflectors with silver ripple reflecting glass to assure proper distribution of light upon the goods within the case. The illuminating effects secured were without glare or shadow, and highly gratifying to both customers and sales force.

About 250 feet of Frink window reflectors are used in the street display windows. These were set in a recess formed in the false ceilings about eight inches from the plate-glass front.

The rear side of this recess was projected down below the ceiling line in the form of a molding and arranged and worked in as a part of the panel-ing effect of the ceiling. This projection, while not interfering in any way with the ornamental effect of the window ceiling, eliminates the possibility of "back reflection" which would be liable to occur were the light allowed to reflect directly upon the rear wall of windows.

The real reflecting element of these reflectors is made of silver ripple glass arranged at such angles as to prevent any reflection into the eye of persons observing the goods displayed in windows.

The illumination of the rug display racks will be rather unique and very effective, inasmuch as the arrangement provides for two intensities of light to secure approximately correct lighting effect for each article displayed. This

rack consists of a number of inverted right-angle triangular frames, pivoted on the vertical side between two horizontal bars so as to swing to and fro like a door or gate.

Arranged in semicircular form directly outside of the limits of the arc described by the swinging members of this rug rack, and attached to the ceiling by means of permanent fixture blocks, are the Frink reflectors. They are so designed, with regard to diffusion of light by means of the arrangement of the silver ripple glass reflectors, as to uniformly illuminate the whole surface of the rugs under inspection.

A special shield arranged directly below the reflector serves to prevent the

Appleton Exhibit Booth at Railway Con vention.

light from interfering with the customer's vision of the rugs on display.

In the art gallery, which is arranged in the form of bays independent of the walls of the building, the Frink reflectors are supported on arms extending out from the top molding above the pictures. These reflectors are also so arranged as to evenly diffuse the light upon the goods without any reflection into customer's or salesman's eyes.

All Frink reflectors are made of special heavy-gauge metal to insure strength. The lining, or light-reflecting medium, is a special silver ripple glass arranged at such angles in each instance as to evenly diffuse the light as required by the dimensions of the desired illuminated area. 15 to 60-watt tungsten lamps will be used throughout.

This entire installation was handled and installed under the supervision of the H. W. Johns-Manville Company, New York, N. Y., which is sole selling agent for all the Frink products.

The Lumograd.

A compact, neat, portable instrument for the measurement of illumination, which reads directly in candle-feet is being introduced by Siemens Brothers Dynamo Works, Dalston, England. It is completely self-contained and there are no accessories, excepting where a tripod stand is required for the measurement of candle-feet. Storage cells are not necessary. Each "Lumograd" is supplied with three glasses of different densities, one set of glasses giving a range from 0.0625 to 2.5 candle-feet, the next ranging from 0.5 to 4 candle-feet, and the third set from 1.0 to 8 candle-feet. Measurements are made by comparing the reflection on both sides of a light-proof screen, one side being illuminated by the external light source and the other by the standard lamp. The lamp may be moved backwards and forwards until both sides of the screen are equally illuminated. This operation is accomplished by means of a thumb screw attached to a toothed wheel and rack. A pointer is fixed to the same shaft, and indicates on the dial the illumination value in candle-feet.

Display of Appleton Unilets.

At the recent convention of the Association of Railway Electrical Engineers, in Chicago, the Appleton Electric Company, of Chicago, had a very attractive exhibit covering its new line of stamped-steel Unilets, etc. This company has now specialized on drawn-steel fittings to replace its original line of cast-iron fittings for electrical construction work.

Being of steel, these fittings are therefore much stronger than the cast-iron fittings now on the market, and at the same time afford much more room inside of the boxes to make and tape connections, etc. The company manufactures a very complete line of porcelain covers which fit snugly to the Unilets, making an extremely neat job of conduit work.

Unilets are furnished with a sherardized finish which makes them practically rustproof, at the same time leaving the threads in the nipples clean for screwing on the pipe. If so desired, they may be obtained with a coat of black japan enamel.

Some Appleton Unilets Displayed.

A unique fitting was displayed at the convention in the form of a round box with an adjustable swivel which permits attaching thereto any make of snap switch as well as any standard make of round-base receptacle, socket, rosette, etc., on the market. Unilets, of steel, are now made in all types and sizes for one-half inch to two-inch conduit, inclusive.

Herewith are shown a few types of Unilets which were exhibited at the convention. The company was represented by R. P. Tillotson and C. Bloom.

Telephone dispatching became operative on the entire main line of the Lehigh Valley Railroad, from New York to Buffalo, on November 1.

It has been only about two years since the first installation on the main line was made. The new system was demonstrated a success so promptly and so conclusively that the telephone lines were extended rapidly. It enables trains to operate more smoothly, and has resulted in minimizing delays in both freight and passenger service.

Myrlite Cleaners.

The Myrlite Company of America, Pownal, Vt., has put upon the market a material for use in cleaning reflectors of all kinds, globes on Mazda, gas and arc lamps, glass meter covers, mirrors, windows, etc. This material is an insoluble, neutral carbonate, free from silicon, acids, alkalies and soap compounds. It does not make microscopic scratches on the glass to act as dirt collectors. It is applied on a piece of soft cloth, after which the surface is polished immediately with a dry cloth, no time being wasted in waiting for the material to dry. It works quickly and gives a crystal brightness without leaving a dirt-collecting film as in the case of soap cleaners. The globes consequently remain clean much longer.

Reflectors and outer globes of inclosed arc lamps can be cleaned on the circuit when the lamps are trimmed, but owing to the smallness of the opening of the inner globe, it will probably have to be taken to the station for a thorough cleaning, as is already customary.

It is claimed that the acquired depreciation of lamp globes and reflectors ranges from 15 to 50 per cent. This can be partially cut down by appropriate cleaning, which the use of Myrlite makes more readily possible. The cost of maintenance is reduced because the cleaning is more permanent.

Motor-Driven Slicing Machine.

The spirit of conservation and efficiency has pervaded all industries and trades. An example of their application is shown in the very efficient motor-driven slicing machine illustrated and described, which is rapidly displacing the butcher's knife. This machine is known as the V. B. P. slicer, and is used to slice dried beef, bacon, boiled ham and all kinds of boneless meats, producing a perfect slice of uniform thickness all the way through. A change in thickness can be made in a second by a single adjustment.

Any one who has ever had to remove rind from bacon knows how difficult it is to do it without waste. An attachment on this machine removes rinds at the same time that the slicing is done. One motion on the slicer simultaneously removes the rind and does the slicing, resulting in a saving of time and meat.

It is stated that this machine will pay for itself in a short time owing to the economy it effects over slicing by hand. It is a great time-saver for the butcher, and hence permits him to handle more orders per day. The saving it effects in meat is also considerable.

The knife is a finely tempered disk, with a razor-like edge, which is maintained by a patented automatic sharpener. This device consists of two grindstones operating automatically. The outside stone grinds only on the bevel and always at exactly the right angle. The inside stone takes off the burr or rough edge only, and by the combined action of the two, there is maintained a keen, sharp edge. The work of sharpening requires only a few seconds. To prevent any accidental contact with this sharp knife, an efficient knife-guard is provided, which affords the utmost protection to the operator and renders the machine safer to handle than the butcher's knife.

The sanitary features have not been overlooked and close examination will reveal no crack or crevice of the machine where small particles of meat or dirt can lodge. All parts requiring lubrication are protected and there is no possibility of the oil coming in contact with the meat.

Meat-Slicing Machine.

The slicing machine is handsomely finished, all the exposed parts being heavily plated. It is mounted on a pedestal which is artistically finished with rich green and gold trimmings, making it a handsome ornament and one that adds dignity and prestige to any store or shop in which it may be installed.

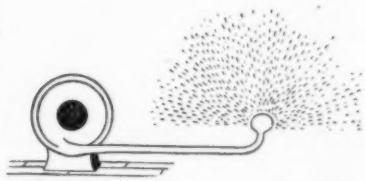
The machine has a normal capacity of approximately 50 slices per minute, though this can be varied to values either below or slightly above if desired, though the higher speeds are not recommended. Sixteen different thicknesses of slice are provided for by an adjustment which may readily be made by the operator.

The machine in the illustration is shown in the act of cutting dried beef while installed in a store window in New York City. It is driven by a 0.5-horsepower, 2,000-revolutions-per-minute, 110-volt direct-current Westinghouse motor. If desired, the slicer may be mounted on the counter or shelf instead of the pedestal, and the motor may then be mounted beneath the floor. The machines are handled by the U. S. Slicing Machine Company, 244 West Twenty-third Street, New York, N. Y.

An Apparatus for the Prevention of Steamy Windows.

A useful device has been brought out by the Anti-Window Steaming Company, Limited, of London, England, for the prevention of the steaming or fogging of shop windows during cold weather, due to the difference of temperature between the outside air and that of the shop, and the consequent condensation of moisture on the window panes. It is obvious to the shopkeeper that clear windows make money and the apparatus mentioned herein is a very simple idea which is nevertheless very effective.

The whole compact apparatus consists of a fan-shaped nozzle set at right angles to a pipe which runs along the base of the shop window inside, and out of sight. Through this nozzle a



Anti-Steaming Device for Windows.

strong air current is impelled by means of a centrifugal blower. In this way dry air is forced through the nozzle over the surface of the window and prevents entirely the accumulation of moisture. The figure shows diagrammatically the way in which the apparatus works.

The whole arrangement can be driven from the lighting circuit and no special installation is made. From the front of the window nothing can be seen but a small shaped ornament in silver, gilt or bronze placed right at the bottom of the window and its purpose can not possibly be guessed by those who do not know for what it is required. Its effect is remarkable. In a test a window was steamed to opaqueness with a boiling kettle and was cleared perfectly within thirty seconds after the apparatus was started, and once started further steaming was quite impossible. There is no doubt that an effective window display is often lost owing to the fogging which damp or cold weather creates.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

MANSON, KAN.—H. R. Healy will remodel the city lighting plant. C.

MARBLEROCK, IOWA. — The town has voted to install an electric light plant. C.

BOYD, MINN.—This village is figuring on installing a $7,500 electric plant.

ABERDEEN, WASH.—The Council will install a cluster-light system on K Street. C.

WAHPETON, N. D.—The Booster Club is working to secure the installation of cluster lights. C.

INWOOD, IOWA.—The Council has voted a franchise to the Sioux Valley Power Company. C.

ST. PETER, MINN.—The Council is considering rebuilding the municipal street-lighting system. C.

DAWSON. N. D.—J. S. Werner will install a dynamo and battery for an electric light plant for the town. C.

ALTOONA, IOWA.—The Council has granted a franchise to George T. Gibson for an electric light plant.

SHELDAHL, IOWA.—The town has voted to grant a franchise for electric lighting to the Boone Electric Company. C.

OSSIAN, IOWA.—The Upper Iowa Power Company will probably extend transmission lines here for light and power. C.

IRON RIVER, MICH.—Riverton Light, Heat & Power Company has been incorporated with a capital stock of $10,000.

PARKER, S. D.—The Council is considering granting a franchise to Charles H. Stansfield for an electric light plant. C.

HEMET, CAL.—The Southern Sierra Power Company is preparing to extend its lighting service to the residents of Park Hill.

MARSHALLTOWN, IOWA.—The Marshalltown Club is raising funds for electroliers on South Third Avenue from Main Street to the Union Station. C.

WINTHROP, IOWA.—Herman Jaeger, of Dyersville, has made a proposition to install an electric light plant here in connection with the water works. C.

BENNINGTON, KANS.—There is an agitation in this town for electric lights and it is believed that the proposition will go through when placed to a vote.

CARROLTON, ILL.—The Public Service Company has been granted a 50-year franchise at Eldred, and will run a transmission line from the plant in this city. Z.

FALL RIVER, WIS.—A movement is on foot to secure an electric lighting plant for this village and the matter is in the hands of the Railway Rate Commission.

HOUSTON, TEX.—The Houston Electric Company has increased its capital stock from $3,000,000 to $4,000,000, for the purpose of making additional improvements. Z.

OWENSBORO, KY.—The Business Men's Association is in charge of plans for the installation of ornamental electric-lighting standards along Main and Fredericka Streets in this city. G.

SPRING LAKE, N. J.—Spring Lake is taking steps toward the installation of a municipal electric lighting plant. It has been estimated that 20 miles of line would cost $20,000 to build.

ECHO, MINN.—Bonds have been voted for electric lighting. The Power Accumulating Company, Dawson, Minn., will install the plant and have it ready for service by December 15.

ROCHELLE, ILL.—The local ornamental lighting system of Sycamore, Ill., has been inspected by a party of 60 business men from this place with a view to installing a similar system.

SPRINGFIELD, MINN.—Installing additional machinery for the electric light plant of the city which is now overloaded, is viewed favorably and the Council has the matter under consideration. C.

CORPUS CHRISTI, TEX.—The Corpus Christi Ice & Electric Company will double the capacity of its electric light and power plant and will also install additional machinery in its ice plant here. D.

RAYMOND, ILL.—The Village Board contemplates a change in the lighting system when the contract expires next year, and has been inspecting the plant of the Hillsboro Electric Light & Power Company. Z.

CLAY, KY.—The Public Service Company has been organized and has received a franchise for the operation of an electric light and power plant from the City Council. The plant is to be installed as soon as possible. G.

TRENTON, N. J.—The Pennsylvania Railroad is understood to be planning for the erection of a new reinforced-concrete power station to replace its present plant on East State Street. The capacity will be greatly augmented. A.

LIVINGSTON, ILL.—The Twin City Light, Heat and Power company, has been incorporated with a capital stock of $2,500, to furnish light, heat and power. The incorporators are D. E. Aylward, Sam M. Westwood and J. D. Mullen. Z.

SULLIVAN, IND.—The directors of the Utilities Coal Company, recently incorporated, is asking for bids for the sinking of two coal mining shafts to be installed and operated by electricity. Telephones will be installed at new mines. S.

BRYANT, ILL.—The Canton Gas & Electric Company will extend its line to furnish power for the substation of the Illinois Central Electric Railway, at Bryant, and the selling of electric energy for light and power, is contemplated. Z.

ROCKVILLE, MD.—Arrangements have been completed whereby the Potomac Electric Power Company will run extensions of its power line to Gaithersburg, Derwood, Washington Grove and Oakmont, altogether a distance of 12 miles.

HINTON, OKLA.—The City Council has signed a contract with the Benham Engineering Company, of Oklahoma City, to make preliminary surveys and estimates for the construction of a new municipal electric light and waterworks plant. P.

LEXINGTON, O.—The Lexington Light & Power Company has been incorporated with a capital stock of $5,000 by George H. Trout, Thomas Cureton, R. M. Chatterton, L. G. Hopkins and W. F. Smith, for the purpose of dealing in light, heat and power.

MORRISVILLE, N. J.—The Pennsylvania Railroad plans for the establishment of a new power plant in connection with its shops at the West Morrisville yards. It is probable that its present machine shop structure will be remodeled for this purpose. A.

LEXINGTON, KY.—The work of installing an arc lighting system about the grounds of Kentucky State University will be begun in the near future. Several thousand dollars' worth of improvements are being made in the property of the institution. G.

COVINGTON, KY.—The City Commissioners are considering the erection of boulevard lights through the principal business portion of Covington and also propose to require the installation of underground telephone, telegraph and lighting wires in that city. G.

JACKSON, MISS.—Benjamin Price, a well known Birmingham, Ala., architect, is in charge of plans for the installation of a deep-well motor pump to be electrically driven, at the State Charity Hospital. The pump will have a capacity of 27 gallons of water per minute. G.

TOLEDO, O.—The Lewis Electric Welding Company has increased its capital stock from $10,000 to $40,000, the purpose being to increase the present output and take on other lines of manufacture such as motor parts. New machinery will be added and more men employed. H.

WACO, TEX.—The Texas Light & Power Company has purchased a site of ten acres here on which it will erect a large central electric power plant at a cost of about $600,000. This plant will furnish the power for operating the interurban line of the Southern Traction Company. D.

NEWELL, W. VA.—A two-phase alternating-current generator and other electrical equipment will be purchased at once by the Edwin M. Knowles China Company, of East Liverpool, O., and Chester, Pa., for the big pottery it is building here, which will be electrically operated. G.

SHELBYVILLE, KY.—J. E. Johnson, of Farmville, Va., may be addressed as the Shelbyville, Ky., representative of the American Tobacco Company, which will install electric presses and other electrical devices for handling tobacco rapidly in its warehouses in Shelbyville. G.

MATOON, ILL.—The Central Illinois Public Service Company will build a 23-mile transmission line to Bethany. The company has been granted a 50-year franchise to operate an electrical distributing system in the village, and a five-year contract to light the village streets has been closed. Z.

CAMBELLSBURG, IND.—Bids are being received upon furnishing the equipment for an electric light plant and street lighting system for this city in the immediate future. Rooms 416-418, No. 5 Beckman Street, New York City, may be addressed for plans and specifications of the work. G.

SUMMIT, ILL.—James Johnston, village clerk, will receive bids until November 18 for construction complete, installed with electric current turned on, of a street lighting plant, with poles, wire and 235 street lights and one transformer for the transportation of electric current to be furnished by the Sanitary District of Chicago. Z.

ARTESIA, N. M.—The Artesia Light & Power Company is constructing electric-power transmission lines from its plant here to a tract of land five miles from town, which is to be irrigated by means of water pumped from shallow wells. About five pumping plants will be installed upon the land and each will be operated by electric power. D.

LIMESTONE, TENN.—The Chucky River Hydro-Electric Company has been incorporated with a capitalization of $25,000 and will establish a power plant for electric light and power on the Nolachucky River near Limestone. J. F. Arnold, Victor M. Weaver, James L. Stewart, Noah T. Heisey and Samuel K. Varnes are the incorporators of the new company. G.

STELLA, NEB.—The Nemaha Valley, Light & Power Company, of this place, has been authorized to issue bonds in the amount of $10,000. The company plans to extend its transmission lines from Shubert, where it has a distributing plant, to Nemaha in one direction, and from Stella to Dawson in another, to furnish light and power to farmers along these lines.

SOMERSET, KY.—The Sublimity Springs property, possessing an excellent power site at the falls of the Cumberland River at this point, was recently sold, L. F. Hubble, of Somerset, engineering the deal. It is understood that the new owners of the property will commence a survey at once with the view or erecting an electric light and power plant at the Falls. G.

GRANBY, MASS.—The Granby Consolidated Mining, Smelting & Power Company has decided to continue the development and equipment of the Hidden Creek property. Instructions have been given to go ahead with the plant, which will have a capacity of 2,000 tons a day. About $500,000 has already been expended and $1,250,000 will be required to complete it. It is expected to have the Hidden Creek plant completed within a year.

INGERSOLL, OKLA.—An election hs been called to vote on a bond issue for a new electric lighting system for Ingersoll. One plan under consideration is to run a line from Cherokee and get the necessary current from that plant. The advocates of this plan claim that the town can be supplied with an efficient lighting service in that way without the expenditure of the large amount of money which would be needed to install a generating plant of its own. P.

EARLVILLE, N. Y.—The Earlville Electric Company has leased for a period of six years of the John B. Hard estate the plant, power rights and good will of the electric power and lighting of its property at Eaton and Morrisville, and it is intended after January 1 to bring in a day current for power and lighting service to Earlville and reduce the meter rate from 15 to 12 cents. The company will also build a line to Poolville and Smyrna in the near future.

LAS ANIMAS, COLO.—Articles of incorporation have been filed by the Inter-Mountain Railway, Light & Power Company. This company owns several electric lighting and heating companies, among which is the Las Animas Electric Company, which has recorded a mortgage on the property of the Inter-Mountain Railway, Light & Power Company and a release of the old mortgage of the Las Animas Electric Company. E. C. Van Diest is president of the new company, and Thomas L. Wilkinson, secretary.

ABILENE, TEX.—N. W. Halsey & Company, of New York City, has acquired the properties of the Abilene Light & Water Company, the Abilene Gas, Light, Fuel & Power Company and the Abilene Ice Company. These holdings consist of the local waterworks system, electric light plant, gas plant and distributing system and ice manufacturing plant. It is announced by the new owners that these various concerns will be consolidated and operated under one management, and that about $100,000 will be immediately expended in enlargements. D.

PITTSBURGH, PA.—Plans of the Clarion River Power Syndicate, which was formed by the merger of 13 power companies several months ago, for a $15,000,000 hydroelectric power plant on the Clarion River have been made public by the Pittsburgh projectors of the enterprise. Engineers have been busy surveying territory in which this company expects to operate and about four more months are said to be necessary to complete arrangements, after which time it is expected to speedily start construction work. The enterprise contemplates the construction of two dams on the Clarion River, at each of which will be located a power plant for the production of electricity for transmission to the city and elsewhere in the district. One dam will be located about a mile above Parker and the other about 32 miles up the River.

PIERRE, S. D.—There are filed with the State Engineer applications for water rights on Rapid Creek for power purposes by three different concerns, namely the Dakota Power Company, the Victoria Waterway and the Rapid River Power, Light & Heat Company. Rapid Creek has a fall of 52.08 feet per mile from Mystic to Rapid City, a distance of about 35 miles. The Dakota Power Company is already producing 3,600 horsepower at its plant at Big Bend and has water rights for two more units below the present one. The Victoria Waterway proposes to tap Rapid Creek some distance above the mouth of Victoria Creek and carry it across a bend to the upper part of Dark Canyon, where it would be dammed into a storage lake. From here it would be conveyed further on to get a higher head. Dark Canyon forms the lower reaches of Vicotria Creek and is one of the deepest, most precipitous sided canyons in the entire Hills. The Rapid Valley Power, Heat & Light Company seeks permission to remove the waters at a point a short distance above the mouth of Prairie Creek. This would be about a half mile above the second plant of the Dakota Power Company and would carry the water the full distance of the Dakota Company's third plant, thence across the bend and crossing Dark Canyon some distance up, finally discharging somewhere near the proposed plant of the Victoria Waterway. All of these projects would involve an immense amount of road work, including much tunneling.

MARBLE FALLS, TEX.—E. C. Alexander, who is building a large reinforced concrete dam across the Colorado River here for the purpose of forming a water storage reservoir to operate a large hydroelectric plant he will install, is promoting the construction of another dam across the Colorado River at a point 25 miles above Austin. The latter dam will be 150 feet high and 1,820 feet long. It will be located at what is known as Lohman Narrows. This dam will form a reservoir that will extend up the river for 47 miles, and will hold approximately 37,500,000,000 cubic feet of water. It is stated that approximately 100,000 horsepower will be available. The special purpose of the project is to provide the initial power for what is said will be the largest hydroelectric plant in the Southwest. Mr. Alexander and associates have filed on all the unappropriated waters of the Colorado River in the upper watershed of that stream. It is their purpose to construct power transmission lines from the hydroelectric plant to cities and towns within a radius of 150 miles. It is stated by Mr. Alexander that the project has been financed and surveys for the works are now being made. The site of this proposed dam is only about 22 miles above the large dam which the city of Austin is constructing across the Colorado River. It is stater, however, that the new project will in no way interfere with the municipal enterprise unless the waters in the upper reservoir that Mr. Alexander and associates are to establish is used extensively for irrigation purposes, in which event it would replete the supply for the Austin project. The purpose of the proposed reservoir is primarily to afford power for generating electrical energy, it is stated. The cost of the dam and power plant which the Alexander syndicate is promoting will be more than $1,500,000. D.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

MISSOULA, MONT.—The Western Union Telegraph Company will remodel its local office at a cost of $6,000. C.

TROPICO, CAL.—The Pacific Telephone & Telegraph Company has been granted a 21-year franchise in this city.

REDLANDS, CAL.—All public utilities companies have been ordered to place their wires underground on the main streets of the business section of this city.

CARPINTERIA, CAL.—It is probable that the Sunset Telephone Company will install a local exchange at this place as soon as the electric lights are in operation.

LAHORE, VA.—The Pamunkey Mutual Telephone Company has been organized with W. N. Green as president and M. S. Johnson, secretary, treasurer and manager.

ROCHESTER, MICH.—The Bell Telephone Company is spending some $10,000 in improving its local service here. Every portion of the system of the county will be reinstalled.

TRENTON, KY.—Plans for the extension and improvement of the system of the Trenton Telephone Company are in the hands of the company's stock-holders. G.

DANVILLE, KY.—The East Tennessee Telephone Company is planning the installation of a central-energy exchange in this and a number of other Kentucky cities. G.

BOWLING GREEN, KY.—The Cumberland Telephone & Telegraph Company is considering the installation of a central-energy exchange here to replace its present equipment. G.

DECATUR, ILL.—The City Council has passed an ordinance granting a franchise to the Central Union Telephone Company. It will be necessary to have the measure confirmed by the voters of the city. Z.

MERIDEN, CONN.—The Board of Works has granted permission to the New England Telephone Company to lay underground wires on all but Pratt Street, as this highway will be torn up in the spring, when conduits will be laid.

SPARKS, NEV.—The City Council has granted a franchise to the Sierra Telegraph & Telephone Company to operate in this city in competition with the Pacific Telegraph & Telephone Company on conditions that it does not at any time sell out to the Pacific Telegraph & Telephone Company.

PARIS, KY.—The Cumberland Telephone & Telegraph Company will install a central-energy system and make extensive improvements in its plant here in the near future. The company will spend about $50,000 in improving its local and toll service at that point.

CAMP CROOK, S. D.—The Camp Crook & Buffalo Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are William Fried, L. A. DeBelloy, C. T. Morton, A. R. McDermott, of Camp Crook, and Fred W. Wilson, of Buffalo. The company has been organized to build a telephone line between Camp Crook and Buffalo, and to operate generally in Harding County.

ELECTRIC RAILWAYS.

(Special Correspondence.)

TOLEDO, O.—Surveys are being made for the extension of the Toledo and Indiana electric line from Bryan to Montpelier.

ASBURY PARK, N. J.—Indications all seem to be favorable to an extension of the Atlantic Coast Electric Railway Company's system to Brielle.

HUTCHINSON, MINN.—The Electric Short Line of Minneapolis plans extending its line from Lake Minnetonka to this city during the coming year. C.

SPRINGFIELD, ILL.—The city Commission will grant the Springfield Consolidated Railway Company a franchise to lay a double track on Monroe Street. Z.

TIFFIN, O.—The City Council has granted a new 25-year franchise to the Tiffin, Fostoria & Eastern Electric Railway Company to operate in the city of Tiffin.

ARLINGTON, MASS.—Double tracking of the Bay State street-railway line between Arlington and Winchester, is in contemplation. The selectmen of Arlington are asked for permission to locate. W.

ROME, N. Y.—Articles of incorporation have been filed by the Rome & Delta Dam Electric Railway Company, having a capital stock of $250,000. This company will ultimately build to Boonville, it is announced.

SAN FRANCISCO, CAL.—It is reported that Law Brothers, owners of the Fairmount and St. Francis Hotels in this city, are interested in the building of an electric road through San Rafael, with a ferry system from San Quentin or Richardson's Bay to their property at North Beach, San Francisco.

BANDON, ORE.—Articles of incorporation have been filed for the Bandon & Oregon Eastern Railroad Company with a capital stock of $100,000, by Roscoe C. Nelson, H. D. Simon and J. V. Beach. It is proposed to build a railroad from Bandon to Eagle Point, and also branch lines from Bandon to Marshfield and Post Oxford.

ORLANDO, FLA.—The proposal of B. Beacham to build an electric railroad connecting Orlando, Sanford and Kissimmee is meeting with considerable favor, $20,000 having been subscribed to the project in four days. Mr. Beacham has declared his intentions of putting up $50,000 to build the road, if the merchants along the line would subscribe a like amount.

LOS ANGELES, CAL.—The City and the Pacific Electric Railway Company have compromised on a plan for the relief of traffic congestion on Main Street. It has been decided to construct a link of the municipal railway on San Pedro Street between Ninth and Alviso, by the city; the road to be actually built by the Pacific Electric for the city, on payment of a small installment.

WASHINGTON, D. C.—Announcement has been made of the sale of the Baltimore & Washington Transit Company to the National City Transit Company, recently organized under the charter of the Baltimore & Ocean City Railroad Company of Maryland, and of granting a permit by the Commissioners of the District of Columbia to the new concern to operate a line of motor buses.

SAN JOSE, CAL.—The San Jose Terminal Railroad Company has been granted permission to issue bonds in the sum of $400,000 for the purpose of building an electric railroad between San Jose and Alviso, and establishing ferry service between Alviso and San Francisco. In granting the bond issue the Railroad Commission requires that the company shall raise $85,000 before beginning construction.

DALLAS, TEX.—It is reported that the electric light and power plant of the Texas-Mexican Electric Light & Power Company, of Eagle Pass, has been purchased by J. F. Stirkland, of this city, and associates. It is further stated that the new owners plan to construct a system of electric railways in Eagle Pass and Piedras Negras, situated in Mexico just across the Rio Grande from Eagle Pass, and to extend the lighting system in both cities.

PROPOSALS.

ELECTRICAL SUPPLIES.—Sealed proposals will be received at the office of the Chief Signal Officer, War Department, Washington, D. C., until November 15, under Proposal 616 for furnishing 100 buzzers, 350 outlet boxes, 125 iron boxes, 150 plugs for target range outlet boxes, 2,000 push buttons, etc. For further information address, J. R. Burt, captain, Signal Corps, U. S. Army Disbursing Officer.

ELECTRIC CONDUITS AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until December 10 for the electric conduits and wiring and interior lighting fixtures of a one-story building for the post office at Wooster, O.; until January 2, of a two-story building for the post office at Morgantown, W. Va. Drawings and specifications may be obtained from the office of the Supervising Architect.

OUTSIDE WIRING, TRANSFORMERS, ETC.—Sealed proposals will be received by Samuel G. Dixon, M. D., Commissioner of Health, Philadelphia, Pa., until November 12 for furnishing the outside wiring, ducts, transformers, poles, ground lighting, etc., for the electric plant for the State Sanatorium for Tuberculosis near Cresson. Plans and specifications may be obtained at either the Harrisburg or the Philadelphia offices of the Pennsylvania Department of Health upon deposit of $25.

ELECTRIC LIGHTING SYSTEM.—Sealed proposals indorsed "Proposals for Electric Lighting System, Pipestone Indian School, Minnesota," and addressed to the Commissioner of Indian Affairs, will be received at the Indian office, Washington, D. C., until November 20, for furnishing materials and labor for the installation of an electric lighting system at the Pipestone Indian School, Minn., in accordance with the specifications and instructions, which may be examined at the above named office or the offices of the Supervisor of Construction, Denver, Colo.; the Argus-Leader, Sioux Falls, S. D.; the Improvement Bulletin, Minneapolis, Minn.; the U. S. Indian Warehouses, Chicago, Ill.; St. Louis Mo., and Omaha, Neb., and at the School.

NEW PUBLICATIONS.

NEW YORK COMMISSION REPORT.—The Public Service Commission of New York for the First District has issued Vol. IV. of its report for the year 1910 and Vol. I of the report for 1911. The former contains statistics of the gas and electric corporations. The latter contains a statement of cases decided and orders adopted by the Commission in 1911; plans, reports, etc., regarding subways and rapid transit facilities; auditor's report, etc.

TREATING RAILROAD TIES.—A paper-covered pamphlet of 105 pages entitled "Some Facts About Treating Railroad Ties" has been published by W. F. Goltra, of Cleveland, O. This work is the result of many years of practical experience in treating railroad ties. It consists largely of matter which has been already published in the *Railway and Engineering Review*, and takes up the different methods of preservative treatment along with the discussion of the best methods of handling. This book should prove of value to anyone interested in wood-preserving. Copies may be obtained from the author for $1.00.

RESISTANCE STANDARDS.—Reprint No. 181 of the Bureau of Standards is entitled "The Four-Terminal Conductor and the Thomson Bridge," by Frank Wenner. Shunts for the accurate measurement of large currents have two current terminals and two potential terminals, and the use of these in measurements by the Thomson bridge is fully discussed. The conditions which must be met in order that the resistances be definite are discussed, as well as the points to be observed in the design of low-resistance standards, especially for alternating current. The way in which measurements are carried out by the Bureau of Standards is described. The theory of the Thomson bridge is discussed at length.

FINANCIAL NOTES.

While the current week has witnessed one of the most important presidential elections in a generation, the speculative markets have been unaffected by way of discounting results. Strong probability of commercial and industrial readjustment as the consequence of tariff legislation and enactments to control corporate activities under ordinary circumstances would have precipitated a pre-election scare, but nothing of this kind has happened. It is apparent that the markets in general are beginning to discount the revival in general trade incident to the big harvests without regard for domestic politics. The probability of an early settlement of the Balkan crisis has improved conditions with regard to foreign apprehension, and the commercial and industrial development dependent upon peace will probably receive a greater measure of assurance within a comparatively short time.

Speyer & Company, New York City, have purchased from New York State Railways $6,925,000 fifty-year first-consolidated mortgage 4.5 per cent bonds, Series "A," and in conjunction with Harris, Forbes & Company, will shortly offer these bonds for subscription. The New York State Railways, organized in 1909, owns leases and operates electric street railways allied with New York Central, which owns about $13,600,000 of the company's $19,900,000 common stock. The New York State Public Service Commission has approved the above issue of bonds, which are tax exempt in New York state.

The offering of $5,000,000 six-per-cent preferred stock of the Utilities Improvement Company, with a forty-per-cent bonus of common stock, made by Henry L. Doherty & Company, New York City, has been more than $10,000,000 oversubscribed. Individual subscriptions aggregated 3,726, came from practically every state in the Union. It is hoped to fill all subscriptions of $1,000 and under in full. An additional offering of $5,000,000 of the preferred on the same terms as the American offering will soon be made in London and advance tenders make certain that the London offering also will be oversubscribed. The closing of subscriptions to the securities also marked the thirtieth anniversary of the entrance of Henry L. Doherty into the gas and electric field.

October gross of Boston Elevated broke all previous records by a substantial margin. The actual income for the month was within a few thousand of $1,500,000. May last was the largest previous month in Elevated's history. The increase over October, 1911, was about $114,000, a gain of nearly nine per cent. This contrasts with slight increases of but $18,222 in September and $9,789 in August.

Reports of Earnings.

MASSACHUSETTS ELECTRIC.

The Massachusetts Electric Company reports for the quarter ended September 30, 1912, as follows:

	1912	1911
Gross	$2,821,607	$2,772,291
Net	1,291,816	1,227,739
Charges and taxes	495,762	468,676
Surplus	796,054	759,063

The Massachusetts Electric Company reports for the year ended September 30, 1912, as follows:

	1912	1911
Gross	$9,165,519	$8,938,815
Net	3,373,861	3,255,931
Charges and taxes	1,867,415	1,851,786
Surplus	1,506,446	1,404,144

UNION RAILWAY, GAS & ELECTRIC.

The Union Railway Gas & Electric Company of Illinois and Indiana reports for September and nine months ended September 30, 1912, as follows:

	1912	1911
September gross	$ 348,075	$ 259,757
September net	159,832	124,868
Surplus after charges	56,355	52,180
Nine months' gross	2,772,537	2,272,571
Nine months' net	1,217,385	1,031,681
Surplus after charges	440,192	400,174

WEST PENN TRACTION & WATER POWER.

The West Penn Traction & Water Power Company (controlling the West Penn Traction Company), reports for the year ended September 30, 1912, as follows:

Gross	$2,899,521
Expenses and taxes	1,535,997
Net	1,363,525
Fixed charges	900,073
Surplus	463,451

CONEY ISLAND & BROOKLYN.

The report of the Coney Island & Brooklyn Railroad Company for the year ended June 30, 1912, shows net earnings of $324,308, against $463,423 in 1911. The surplus after charges was only $25,896, equal to 0.86 per cent earned on the capital stock, as compared with 6.07 per cent earned last year. The income statement compared as follows:

	1912	1911
Operating revenue	$1,415,133	$1,538,003
Net after taxes	$24,308	463,423
Other income	31,235	25,954
Total income	$ 355,543	$ 489,377
Interest and rent	329,647	308,242
Net corp. income	$ 25,896	$ 181,135

CITIES SERVICE COMPANY.

The Cities Service Company reports earnings for the twelve months ending September 30, 1912, as follows:

Gross earnings	$1,152,252
Expenses	82,596
Net earnings	1,069,656
Preferred dividends	586,932
Common dividends	200,855
Surplus	281,868

The total surplus to September 30, 1912, is $503,797.

UNITED LIGHT & RAILWAYS.

United Light & Railways, for September, 1912, and the three months ended September 30, 1912, reports consolidated earnings of subsidiary companies as follows:

	1912	1911
September gross	$ 389,124	$ 360,838
September net	174,398	153,676
September surplus	99,468	75,366
Three months' gross	1,165,268	1,062,283
Three months' net	509,348	448,412
Three months' surplus	280,444	214,921

Earnings available for securities of United Light & Railways, for three months ended September 30, 1912:

Gross	$311,613
Net	222,381
Dividends, first preferred	74,982
Dividends, second preferred	22,933
Balance	124,466
Total surplus to September 30, 1912	236,904

Balance earned for three months on United Light & Railways common was at rate of 9.4 per cent on the outstanding issue of $5,287,500.

The Kings' County Electric Light & Power Company has declared a quarterly dividend of two per cent.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Nov. 4.	Oct. 28.
American Tel. & Tel. (New York)	142½	142¾
Commonwealth Edison (Chicago)	145	144
Edison Electric Illuminating (Boston)	274¼	273¾
Electric Company of America (Philadelphia)	*12¼	*12¼
Electric Storage Battery common (Philadelphia)	54	55¼
Electric Storage Battery preferred (Philadelphia)	54	55¼
General Electric (New York)	180⅛	180⅛
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	1¾	2
Massachusetts Electric common (Boston)	19½	19
Massachusetts Electric preferred (Boston)	77	77
National Carbon common (Chicago)	126	129
National Carbon preferred (Chicago)	120	120
New England Telephone (Boston)	153	149½
Philadelphia Electric (Philadelphia)	22¾	23
Postal Telegraph and Cables common (New York)	83½	83¾
Postal Telegraph and Cables preferred (New York)	67½	67½
Western Union (New York)	78	79¾
Westinghouse common (New York)	81¾	82¾
Westinghouse preferred (New York)	*122½	*122½

*Last price quoted.

PERSONAL MENTION.

C. O. MAILLOUX has been appointed assistant to the president of the Granby Consolidated Mining, Smelting & Power Company, of Canada.

C. B. NICCOLLS, of the engineering Department of H. M. Byllesby & Company, Tacoma, Wash., has been transferred by his company to the same department in the Chicago office.

D. C. GREENE, manager of the Oregon Power Company, Marshfield, Ore., has been elected Marshfield representative of the Coos Bay Good Roads Association with the title of vice-president.

HENRY C. CUMMINS, who has been for some time assistant manager of the Consumers Power Company, Fairbault, Minn., has been promoted to the position of manager of the Stillwater (Minn.) office of this company.

E. B. BUMSTEAD, formerly connected with the Engineering Department of Stone & Webster, has been appointed vice-president of the Oro Electric Corporation of California and will be placed in charge of the departments of operation and construction.

CLOUD WARRINGTON, who formerly represented Macbeth-Evans Glass Company in the southern states, has resigned from that company to become special southern representative of The Haskins Glass Company, with headquarters in New Orleans, La.

ARTHUR THOMAS has been appointed superintendent for the Lincoln Railway & Power Company, Lincoln, Ill., to succeed T. Blinn, who has accepted the managership of the Central Illinois Telephone & Telegraph Company, with headquarters at Pine Bluffs, Ark.

WILLIAM M. CONNELLY, district manager of the Electric Controller & Manufacturing Company, Chicago, Ill., on Wednesday evening, November 6, delivered an illustrated lecture on "Commercial Applications of Lifting Magnets" before the Armour Institute of Technology Branch of the American Institute of Electrical Engineers.

HERBERT A. FAULKNER, who for several years has been passenger agent and publicity manager for the Bay State Street Railway Company, has tendered his resignation to become secretary of the New England Street Railway Club, succeeding John J. Lane, who has retired on account of ill health. Mr. Faulkner's successor with the Bay State Company is Ralph M. Sparks.

R. E. FLOWER, manager of the New Business Department of the Mobile Electric Company, has been appointed by the Mobile Chamber of Commerce and Business League as a member of its Publishing Committee in connection with its new official organ which will hereafter make its appearance in the form of a monthly bulletin. Vol. 1, No. 1 of this bulletin has just been published.

KARL E. ERIKSSON, of Stockholm, Sweden, is in this country studying American practice in high-tension engineering. He is a graduate of the Royal Technical Institute of Stockholm and was an instructor in its department of electrical engineering for four years. He has been retained by the Swedish patent office as expert on electrical matters. Mr. Eriksson has conducted research work on high-tension phenomena and has written articles on protection of high-tension lines.

JAMES A. ATWOOD, who has been in the electrical business for the past 15 years, the last six having been spent as estimating electrician for the Charles Q. Tyson Company, Dayton, O., has opened an office in the Conover Building, Dayton, and gone in business for himself. Upon his retirement Mr. Atwood was presented by the Charles Q. Tyson Company with a fine traveling bag and elegant desk set.

SAMUEL KAHN, who has been connected with the Operating Department of H. M. Byllesby & Company, Chicago, Ill., has been appointed assistant to Elmer Dover in the operation of the Western properties of this company. This group includes the Oregon Power Company, Northern Idaho & Montana Power Company, the Tacoma Gas Company, the Everett Gas Company and the Western States Gas & Electric Company.

A. W. ZAHM, for twelve years general manager of the Peoples Gas & Electric Company at Mason City, Iowa, has resigned to become general manager of the Minneapolis Electric Equipment Company, of Minneapolis, Minn. This will become effective January 1. Mr. Zahm has been prominently identified with the electric industry in the state, having served as president of the Iowa Electrical Association and for the past two years acting as secretary.

F. M. TAIT, of Dayton, O., president of the National Electric Light Association, has returned home after a two-week tour of the eastern section of the country, delivering addresses at Boston, Philadelphia, New York and other cities. The advancement of electrical development and allied topics constituted the foundation of the addresses. The association, of which Mr. Tait is the head, has a membership of 13,000, distributed over the entire country. Mr. Tait is making preparations to leave on another and similar lecture tour, taking in other sections of the country.

J. J. FREY, who has just been elected president of the Illinois State Electric Association, has been engaged in the central-station business about 18 years. He is president and manager of the Hillsboro Electric Light & Power Company, of Hillsboro, Ill. This plant he started with a capital investment of about $10,000; through his progressive management the plant investment now is nearly $800,000. Mr. Frey was one of the first central-station men in Illinois to build transmission lines into territory contiguous to his station; now he has about 60 miles of such lines supplying 16 towns with a population of about 25,000. The Hillsboro station has 2,000 kilowatts in generating equipment, an auxiliary artificial ice plant, and also supplies exhaust-steam district heating. Mr. Frey is also president and manager of the Collinsville Electric Company, Collinsville, Ill., whose 1,000-kilowatt station lights three cities. Mr. Frey is a member of the National Electric Light Association and is 45 years old.

OBITUARY.

WILLIAM WORKMAN, aged 25 years, of Washington, Pa., superintendent of engineers for the Washington Electric Light & Power Company, died at his home on October 22, following a two weeks' illness from typhoid fever. He leaves a widow and one daughter. During his school and college days, Mr. Workman was one of the best known athletes in Western Pennsylvania. He played on the football teams of Mercersburg Academy and the Washington and Lee University. He was a member of the Beta Theta Pi fraternity.

NEW INCORPORATIONS.

POTEAU, OKLA.—An Oklahoma charter has been issued to the Mullergren Engineering Company with a capital stock of $1,000. The incorporators are A. L. Mullergren, W. F. Donothan and U. F. Shofner, all of Poteau. P.

NEW YORK, N. Y.—Expert Sales Corporation has been incorporated with a capital stock of $10,000 to deal in electrical appliances, etc. The incorporators are Theodore M. Hill, Bradford Darrach, Jr., and Elizabeth M. Rooney, all of New York City.

CINCINNATI, O.—The E. L. Jones Electric Company has been incorporated with a capital stock of $10,000 to engage in the business of illuminating, engineering and electrical specialties. The incorporators are A. A. Anthony, R. M. Peitz, W. G. Caldwell, R. R. Caldwell and E. J. Tracy.

ST. LOUIS, MO.—Allino Switch Box Manufacturing Company has been incorporated with a fully paid up capital stock of $60,000, to manufacture, buy, sell and deal in electrical appliances, switch boxes, tools, dies and electrical machinery. The incorporators are J. F. Brinkmeyer, C. C. Maison and W. F. Peters.

PORTLAND, ORE.—The Ewbank Electrical Transmission Company has filed articles of incorporation with a capital stock of $2,500,000. Max Smith, Marion F. Dolph and Willis McGuire are the incorporators. The purpose of the company is to deal in electrical appliances, transmission of power and electrical railways and franchises.

DATES AHEAD.

Electrical Supply Jobbers' Association, Hot Springs, Va., November 13-15.

Association of Telephone Pioneers of America. Annual convention, New York City, November 14-15.

Alabama Light and Traction Association. Birmingham, Ala., November 14-15.

Ohio Society of Mechanical, Electrical and Steam Engineers. Eleventh annual meeting, Akron, O., November 21-23.

American Mining Congress. Fifteenth annual meeting. Spokane, Wash., November 25-28.

American Physical Society. Chicago, Ill., November 30.

American Society of Mechanical Engineers. Annual meeting, New York, N. Y., December 3-6.

American Institute of Chemical Engineers. Annual meeting, Detroit, Mich., December 4-6.

American Association for Advancement of Science and affiliated societies. Annual meeting, Cleveland, O., December 30-January 4, 1913.

Electrical Contractors' Association of New York State. Annual meeting, Syracuse, N. Y., January 21, 1913.

Western Association of Electrical Inspectors. Annual meeting, St. Louis, Mo., January 28-30, 1913.

With the Electrical Manufacturers

The Freeman Electric Company, Trenton, N. J., manufacturer of electrical specialties, will build a two-story addition to its plant, 24 by 72 feet, on Meade Street.

Elmer P. Morris Iron Works, Inc., 90 West Street, New York City, has taken the selling agency for the eastern states and for export business of the Morris Iron Company, of Frederick, Md.

Naugle Pole & Tie Company, 5 South Wabash Avenue, Chicago, is sending out folders calling attention to the large stock of poles in its new Chicago yard, and to the excellent shipping facilities which enables that company to make prompt shipments, particularly in carload lots.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued publication No. 3508 on the subject of paper-mill motors for the finishing mill, in which is given some information with reference to the use of motors in paper mills, together with several interesting illustrations showing the applications.

W. L. Fleisher & Company, Incorporated, have removed to 31 Madison Avenue New York City, where increased working space will permit greater efficiency in carrying on the business. This company was originally at 156 Fifth Avenue and succeeded to the business of Francis Brothers & Jellett, Incorporated, as electrical and mechanical engineers.

The Waverley Company, Indianapolis, Indiana, has issued its dealers' announcement of electric vehicles for 1913. This booklet contains six attractive pages of three and four-color process work, showing the complete line of Silent Waverley electrics from the sheltered roadster to the five-passenger limousine and various delivery wagons up to the five-ton truck.

The Electric Storage Battery Company, Philadelphia, Pa., has issued Bulletin No. 137, entitled "Some Recent Developments in the Lead Battery for Electric Vehicles." The bulletin deals almost entirely with improvements in the Ironclad-Exide battery which have put the electric vehicle in a decidedly advanced position as a reliable and efficient vehicle for all kinds of service.

American Engineering Company, Philadelphia, Pa., has published a 48-page bulletin giving facts concerning the operation of Taylor stokers; included in this publication are results of many tests of this equipment and in each test report are given full data of the details of the test as well as of the final results. Many curve sheets show the performance of the stoker graphically.

Kentucky Wagon Manufacturing Company, Louisville, Ky., has greatly enlarged and improved its factory so as to increase its capacity for building electric commercial vehicles. This department of the company's business was undertaken about a year ago with the manufacture of the Urban electric trucks. The present demands call for some three times the former output of this line alone.

The Curtis & Curtis Company, Bridgeport, Conn., has issued the fourteenth edition of its catalog of pipe-cutting and threading machinery. The catalog gives not only a detailed price list of this equipment, but is copiously illustrated with the various types of machines manufactured by this company, all of which are designed for rapid and accurate pipe-cutting and threading work.

Condit Electrical Manufacturing Company, Boston, Mass., has issued Bulletin No. 400 which describes the Condit carbon-break circuit-breakers. In the first part of this bulletin are described the principal parts of these circuit-breakers, their characteristics and their many forms for various classes of service. Then follows a complete price list of these devices; the bulletin concludes with dimensional diagrams of the different types.

Fewkes-Whalen Company, 140 North Eleventh Street, Philadelphia, Pa., announces the resignation of Joseph T. Fewkes as president of the company. Thomas W. Whalen has suceeded Mr. Fewkes as president and Joseph G. Crosby, vice-president, has assumed the duties of general manager. These changes in the organization of the company will have no effect in the carrying on of its business, which includes electrical and steam engineering, armature winding and repair work of all kinds.

H. T. Paiste Company, Philadelphia, Pa., has sent out a folder calling attention to the new Paiste Fussette. This is a fuse plug designed so that instead of throwing away the entire device when it is blown, it is necessary to throw away only the small porcelain interior containing the fuse which has been termed the Fussette, and thus use over again the cap, screw shell and body. Fussettes are made in capacities from 3 to 30 amperes. Their use is claimed to save 29 per cent of fuse-plug bills.

DeLaval Turbine Company, Trenton, N. J., has issued a new catalog dealing with its multistage turbine. This is a 120-page book, of which about one-third is devoted to a discussion of the speed-compromise problem; the relative advantages of the several fundamental types of turbines are discussed. The remainder of the book gives a detailed description, with many illustrations, of the construction of the DeLaval multicellular turbine, which is built in capacities of 500 horsepower and upwards. The DeLaval speed-reduction gear is also described. Copies of this book may be obtained by those concerned with the operation or management of steam plants.

James G. Biddle, 1211 Arch Street, Philadelphia, Pa., has issued Catalog No. 770, which is devoted to precision electrical measuring instruments, made by the Siemens & Halske Aktiengesellschaft. This catalog contains 48 pages giving complete descriptions with illustrations, of precision millivoltmeters, ammeters, voltmeters and combination instruments for direct-current service, these including a series of shunts and multipliers to adapt them to various ranges. There are also described precision instruments of the electrodynamometer type, suitable for both alternating current and direct current and including voltmeters, ammeters and wattmeters. The catalog also describes special astatic wattmeters, precision current transformers, potential transformers, frequency meters and other instruments.

General Electric Company, Schenectady, N. Y., has added to its publications a number of new bulletins covering recent developments in some of its products. Bulletin No. 4993 is devoted to type RI single-phase motors; included in the publication are not only discussions and illustrations of the characteristics and construction of the motor, but also several views of typical installations.—Bulletin No. A4034 describes the type W long-life flame arc lamp that has been developed for operation on series alternating-current circuits. These lamps are meeting with much favor for street illumination, particularly of important streets in our large cities. They embody the desirable characteristics of the direct-current flaming arcs but eliminate the need for rectifying equipment for the lighting circuits.—Bulletin No. A4037 describes isolated and small-plant switchboards, which have been particularly designed for gasoline-electric sets; they may, however, be used with any generating sets having ratings below 25 kilowatts.—Bulletin No. A4039 deals with direct-current motor-starting and speed-regulation rheostats and panels; included in this publication are dimensional drawings to scale for the various types of equipment.—Bulletin No. A4036 describes direct-current exciter panels for use with alternating-current generator panels, and in which speed control of the exciter is desired.—Bulletin No. 4974 is devoted to illustrations and description of the construction of current-limiting reactances. This new type of apparatus has received much attention in the last two years and is being provided as a necessary part of the auxiliary equipment of all large turbine-driven generating stations.—Bulletin No. A4004 is a revision of a previous publication describing the company's steam-flow meter.

Record of Electrical Patents.

Issued by the United States Patent Office, October 29, 1912.

1,042,383. Locking Device for Lamp-Socket Shells. F. Barr, New York, N. Y. Loops near the upper edge of the shell engage slots in the cap.

1,042,385. Signaling System. A. C. Bell, assignor to Hardinge Brothers, Chicago, Ill. A watchman's electrical signaling and recording system.

1,042,388. Fuse Plug. D. E. Brown, Pittsburgh, Pa. An Edison plug with cover and flange construction.

1,042,389. Telephone System. C. C. Bradbury, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Relates to the relay control of the supervisory signals.

1,042,406. Sign Receptacle. J. S. Crossley and V. R. Despard, assignors to Pass & Seymour, Inc., Solvay, N. Y. Has special means for clamping to sign surface.

1,042,408. Dynamo-Electric Machine. R. J. Dearborn, assignor to Westinghouse Electric & Manufacturing Co. The coil-retaining wedges for the slots in the core consist of iron side pieces and a non-magnetizable center key.

1,042,414. Electric Switch. J. C. Dunfee, assignor to Van Dorn & Dutton Co., Cleveland, O. Relates to details of a rotary snap switch.

1,042,432. Electric Heating Device and Process of Constructing the Same. W. S. Hadaway, Jr., assignor to Westinghouse Electric & Manufacturing Co. An insulated resistance element is coated with conducting material and a metallic layer is then electrodeposited thereon.

1,042,433. Electrically Heated Laundry Roll. W. S. Hadaway, Jr., assignor to Westinghouse Electric & Manufacturing Co. Has the heater units longitudinally disposed between the inner and outer shells.

1,042,434. Inclosed Fuse. F. W. Harris, assignor to Westinghouse Electric & Manufacturing Co. Has a double tube about the fuse element.

1,042,436. Electrically Operated Coupon-Cutting Machine. G. A. Hobart, Paterson, N. J. A solenoid plunger reciprocates the knife carrier.

1,042,440. Electrostatic Voltmeter. J. C. Hubbard, Worcester, Mass. Permits adjustment of the zero position.

1,042,444. Controller. H. D. James, assignor to Westinghouse Electric & Manufacturing Co. Permits variation of the voltage applied to the armature.

1,042,446. Apparatus for Transforming Continuous Currents into Alternating Currents. E. L. Joseph, London, Eng. Includes a motor-driven commutator.

1,042,451. Apparatus for Manufacturing Incandescent Lamps. A. S. Knight, assignor to Westinghouse Lamp Co. An electrically controlled machine for mounting the filament.

1,042,457. Electric Telegraphic Apparatus. H. G. Martin, East Rutherford, N. J. A key controls the operation of a free vibrator that makes and breaks the circuit for both dot and dash signals.

1,042,466. Traveling Electric Welding Apparatus. J. A. Osborn, assignor to American Car & Foundry Co., St. Louis, Mo. A transformer is suspended from a movable carriage and carries adjustments for the transformer and for the tool.

1,042,467 and 1,042,468. Electric Welding Tongs. J. A. Osborn, assignor to American Car & Foundry Co. Relates to the construction of insulated welding jaws.

1,042,473. Automobile Lamp. F. C. Parsche, assignor to F. X. Parsche & Son Co., Chicago, Ill. Consists of a spherical globe the rear half of which is a reflector, the front half transparent, and within which is an electric bulb.

1,042,482. Signaling System. H. O. Rugh, assignor to Sandwich Electric Co., Sandwich, Ill. Relates to the control of the substation selective signaling devices.

1,042,483. Bond Spring for Rail Joints. W. M. Rush, Greensburg, Pa., assignor of one-half to D. M. Smith. A U-shaped spring is clamped between the fish plate and rail and is supposed to convert the former into an electrical bond.

1,042,485. Supporting Means for Electric Motors. H. M. Scheibe, assignor to Westinghouse Electric & Manufacturing Co. The supporting members are recessed.

1,042,677.—Cleat.

1,042,490. Safety Device for Electric-Heater Sadirons. C. E. Skinner, assignor to Westinghouse Electric & Manufacturing Co. The supply circuit is closed only when the operator grips the handle, or the iron is placed on a special stand.

1,042,492. Trolley Wheel. C. E. Smith, Sherman, Tex. Has a special construction for the axle.

1,042,510. Electric-Box Connection. F. H. Ward, Brooklyn, N. Y. Provides a ledge in the opening and a closure resting on the ledge.

1,042,533. Method of Electroplating. L. Daft, Rutherford, N. J., assignor to Electro-Chemical Rubber & Manufacturing Co. By varying the current, the percentage of antimony deposited from an alloy anode is controlled.

1,042,539. Temperature Alarm. W. C. Elsacer, Grand Rapids, Mich. An expansive fluid moves a contact to close the alarm.

1,042,552. Method of and Apparatus for Forming Flexible Tubes. N. S. Harter, Waukegan, Ill. The machine includes an electrically operated clutch.

1,042,554. Cored Carbon Electrode for Arc Lamps. R. R. Herbst, Freeland, Pa., assignor of one-half to G. D. Kugler. Has a longitudinal groove leaving only a thin layer of hard carbon over the core along one line.

1,042,565. Vapor Electric Device. F. Kroner, assignor to General Electric Co. Consists of an inner quartz tube and an outer glass envelope.

1,042,587. Vacuum-Tube Lighting. D. McF. Moore, assignor to General Electric Co. A hanger and coupling for Moore tubes.

1,042,605. Manufacture of Hypophosphoric Acid and of Its Salts. A. Rosenheim, Berlin, Germany. Consists in electrolytically oxidizing metaphosphide anodes in a weak acid electrolyte.

1,042,608. Electric Wiring for Railway Cars. M. M. Schneider, assignor to Pullman Co., Chicago, Ill. The wires are run through hollow pier posts and through conduit between them.

1,042,613. Electric Furnace. J. A. Seede, assignor to General Electric Co. A magnet-controlled electric motor moves the arc electrode in response to variations in the arc.

1,042,615. Overhead Trolley-Switch and Crossover. W. M. Simpson, assignor to Railway Materials Co., Chicago, Ill. Relates to construction details.

1,042,619. Spark Plug. R. A. Stranahan, Toledo, O. Includes a small priming valve.

1,042,623. Electric Flash Light. J. F. Wagner, assignor to Arnold-Wagner Electric Co., South Bend, Ind. All the connections, including a push-button, are made on the back plate.

1,042,624. Rectal Dynamo. J. B. Wagoner, Los Angeles, Cal. Has a metal ring at each end electrically connected by a rod passing through the insulation.

1,042,643. Method for the Detonation of Explosives. H. Brunswig, assignor to E. I. du Pont de Nemours Powder Co., Wilmington, Del. Each end of the looped fuse is connected to the firing circuit.

1,042,677. Insulating Cleat. R. D. Hilty, Carey, O., assignor of one-half to I. N. Zeis. Each section is L-shaped, the wires clamping between the inner corners.

1,042,691. Electromagnet Controlling Device. H. K. Kouyoumjian, St. Louis, Mo. A machine part is controled by an electromagnet arranged to cause rapid separation of the magnet and armature when the current is reduced.

1,042,692 and **1,042,693. Motor-Control System.** C. Krämer, assignor to General Electric Co. A motor with differential fields drives through worm gearing a resistance regulator for the fields.

1,042,698. Electrically Propelled Vehicle. H. W. Leonard, Bronxville, N. Y. Includes a pair of dynamos and a group of motors that are connected in series and parallel and supplied with a variable voltage.

1,042,700. Signal Box. A. D. T. Libby, assignor to Dean Electric Co., Elyria, O. A police box includes an electric lamp visible from outside and a telephone.

1,042,716. Light Concentrator and Projector. C. G. Myers, Cleveland, O. Includes an electric lamp and several telescopic projecting tubes, each having a lens.

1,042,740. Igniting System for the Engines of Automobiles. J. G. Winsor, Detroit, Mich. Includes a special switch for changing from battery to magneto ignition.

1,042,747. Binding-Post. A. A. Zeigler, assignor to United Electric Apparatus Co., Boston, Mass. Has an insulating body.

1,042,770. Electric Regulation, J. L. Creveling, New York, N. Y., assignor to Safety Car Heating & Lighting Co. Electromagnetic means for varying the pressure on a carbon-pile resistance.

1,042,772. Carbon-Grain Cells of Telephone Transmitters. C. E. Egnér, Stockholm, and J. G. Holmström, Saltsjö-Storängen, Sweden. Electrodes connected with the diaphragm close the various cells.

1,042,778. Receiver for Electromagnetic Waves. R. A. Fessenden, assignor to National Electric Signaling Co., Pittsburgh, Pa. The waves cause a change of friction between two bodies.

1,042,790. Telephone Meter. R. B. Head, Denver, Colo. Provides for electrical control of the counter through polarized electromagnets.

1,042,791. Starting Device. C. T. Henderson, assignor to Cutler-Hammer Manufacturing Co., Milwaukee, Wis. Provides for automatic cutting out of the motor-armature resistance.

1,042,811. Telephone-Receiver Holder. W. D. Miller, Butler, Pa. Can hold the receiver to the user's ear.

1,042,814. Circuit-Breaker for Electric Ignition Devices. A. R. Mosler, assignor to A. R. Mosler & Co., New York, N. Y. Includes two rows of balls for positioning the rotary contact and casing.

1,042,818. Spark Plug. A. J. Parchem, assignor of one-half each to W. F. Lebzelter and J. J. Thompson, Lancaster, Pa. Has a cage electrode including a ball.

1,042,839. Shade-Holder. C. A. Terry, assignor to Bryant Electric Co., Bridgeport, Conn. Inside the collar is an overlapping spring coil.

1,042,847. Electric Meter. M. E. Turner, Cleveland Heights, O. A maximum-demand indicator for application to watt-hour meters.

1,042,855. Interference-Preventer for Wireless-Telegraph Circuits. W. L. Walker, Boston, Mass. A transformer with variable inductance adjustment.

1,042,856. Flashlight Apparatus for Cameras. A. E. Wallace, Evansville, Ind. Electric terminals are provided in the flash pan.

1,042,865. Flameproof Switch. W. R. Youmans, Columbus, O., assignor to Jeffrey Manufacturing Co. Includes a mercury and oil chamber in which the contact is broken before the main contacts separate.

1,042,881. Outlet-Box Hanger. L. G. Bowen, Kansas City, Mo. A tubular bushing clamps about the conduit and supports the box on extended split flanges.

1,042,885. Process of Welding. E. G. Budd and J. H. Gravell, assignors to Hale & Kilburn Co., Philadelphia, Pa. Channel bars are welded by placing a strip on each flange and a bar within and passing welding current from strip to strip.

1,042,897. Connecting Device for Electric Conductors. R. R. Dunlop, Columbus, O., assignor to Jeffrey Manufacturing Co. Connection is made within a flameproof cylinder containing an inclosed fuse.

1,042,902. Insulator. J. N. Foutz, Anaheim, Cal. Has a hollow externally threaded base that screws into a metallic socket secured to the crossarm.

1,042, 920. Thermotic Switch. G. F. Humphreys, assignor to C. E. Burgess, Devils Lake, N. D. A contact plug projects into an orifice over a mercury cup.

1,042,993. Telephone Attachment. D. W. Leppert, New York, N. Y. A writing pad fed from a roll is supported on a desk stand.

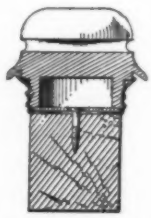
1,042,944. Signal System. C. B. McLeer and J. F. McLeer, assignors to Electric Carrier Co., Wilmington, Del. Along the track of an electric railway is a set of coils for inducing signals in the car.

1,042,954. Selective Ringing Key. C. H. North, assignor to North Electric Co., Cleveland, O. For telephone party lines.

1,042,979. Transparent Hood for Electric Lamps. G. A. Seessle, assignor to Reynolds Electric Flasher Manufacturing Co., Chicago, Ill. A colored glass cap fitting over the tip end of the lamp and having spring fingers to engage the tapering part of the bulb.

1,042,986. Induction Furnace. C. P. Steinmetz, assignor to General Electric Co. In combination with a single-turn primary, consisting of a metallic crucible adapted to contain a furnace charge, are means for insulating the charge from the crucible.

1,043,001. Emergency Means for Electrical Distribution Systems. J. H. Crosier, Philadelphia, Pa. Associated with a main switch is an auxiliary switch and plunger.



1,042,902.—Insulator.

1,043,002. Brake-Actuated Motor Control. H. P. Dodge, assignor to Ohio Electric Car Co., Toledo, O. Application of the brake mechanism raises the plunger of a solenoid and breaks the motor circuit.

1,043,014. Circuit-Controlling Apparatus. R. P. Jackson, assignor to Westinghouse Electric & Manufacturing Co. A circuit breaker includes a compressed-air piston and means for blowing out the arc.

1,043,017. Electrically Actuated Automatic Train-Stopping Mechanism. A S. Littleton, Erie, Pa. Along the track is a sectional conductor through which the power shut-off mechanism is connected.

1,043,023. Trolley. W. T. Miller, Winston Salem, N. C. A special construction for the trolley head.

1,043,028. Dynamo-Electric Machine. J. E. Noeggerath, assignor to General Electric Co. Describes the construction of a unipolar armature.

1,043,029. Electric Heating Unit. L. F. Parkhurst, assignor to Diamond Electric Co., Binghamton, N. Y. The heating element is seated in a spiral groove inside a hollow cylinder.

1,043,030. Static Electric Machine. T. H. Patee, Indianapolis, Ind.; M. J. Patee, administratrix of said T. H. Patee, deceased, assignor to said M. J. Patee, individually. Geisler tubes are revolved about the axle of the machine.

1,043,036. Controlling System for Electric Hoists. F. I. Smith, assignor to Otis Elevator Co., Jersey City, N. J. Starting, speed and reversing control for a furnace-hoisting motor.

1,043,043. Telephone Booth. W. D. Carter, Quincy, Ill. An inner partition carrying the instrument and seat must be pushed to expel all the air on entering the booth.

1,043,047. Rotor for Electric Machines. R. Goldschmidt, Darmstadt, Germany. Segments of the core are separated by an air space and joined only through a dove-tail connection with the spider arms.

1,043,054. Molding Socket and Plug. G. Brooke, New York, N. Y., assignor of one-half to C. Bomeisler. A detachable plug fits into a socket secured between the inner ends of separable molding sections.

1,043,055. Telephone Booth. W. D. Carter, Quincy, Ill. A modification of No. 1,043,043, wherein movement of the inner partition closes the outer door.

Reissue.

13,483. Motor-Control System. K. F. Kingwell, assignor to General Electric Co. Original No. 1,022,029, dated April 2, 1912. A motor-driven pump is started and stopped when certain fluid levels are reached in the storage tank.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired November 5, 1912:

549,094. Brake for Electric or Other Cars. E. S. Amrock, Waltham, Mass.

549,132. Electric Arc Lamp. F. Jehl, Vienna, Austria-Hungary.

549,152. Electric Heater for Curling Irons. G. D. Pogue, Jerseyville, Ill.

549,153. Controlling Electric Motors. W. B. Potter, Schenectady, N. Y.

549,162. Electric Switch. J. B. Smith and A. L. Clough, Manchester, N. H.

549,179. Printing-Telegraph System. J. E. Woodbridge, Duluth, Minn.

549,189. System of Electrical Distribution. W. M. Fairfax, Brooklyn, N. Y.

549,195. Electric Meter. R. O. Hood, Danvers, Mass.

549,201. Incandescent-Lamp Reflector. C. J. Klein, New York, N. Y.

549,209. Electromagnetic Switch, C. L. Penny, Newark, Del.

549,234. Armature for Dynamo-Electric Machines or Motors. W. Decker, Owego, N. Y.

549,237. Electric Switch. G. W. Hart, Hartford, Conn.

549,240 and 549,241. Electrical Annunciator. R. L. Hunter, Minneapolis, Minn.

549,268. Arc Cutout. C. D. Haskins, Newton, Mass.

549,383. Automatic Regulator for Converters of Energy. W. E. Moore, Augusta, Ga.

549,409. Electric Arc Lamp. C. F. Vogelius, Bloomfield, N. J.

549,449. Apparatus for Indicating Difference of Phase. M. Von Dolivo-Dobrowolsky, Berlin, Germany.

549,464. Electrical Dental Engine. F. C. Priestly, Denver, Colo.

549,470. Electrical Resistance. H. E. Werline, Lancaster, Pa.

549,477 Local Transmitter Circuit for Telephones. W. W. Dean, St. Louis, Mo.